


TOSHIBA

Automotive Devices



**Selection
Guide 2022**

Applications of Car Electronics

HEV/EV

Inverter, Motor Generator

DC-DC Converter

Battery Management System (BMS)



Active/Passive Safety

Pre-Crash Seat Belt

Electric Power Steering (EPS)

Brake (ABS, ESC)

Electric Control Suspension

Power Train

Gasoline Engine System

Direct Injection System

Idling Stop

DC-DC Converter

Transmission Control

Cooling Fan

Various Pump (Brushless Motor)

Body Control

Wiper

Body Control Module (BCM)

Air Conditioner (HVAC)

Power Door/EPB

LED Head Lamp

Other

Junction Box

Advanced Driver Assistance System (ADAS)

In Vehicle Infotainment (IVI)

Bus line protection

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Product Lineups

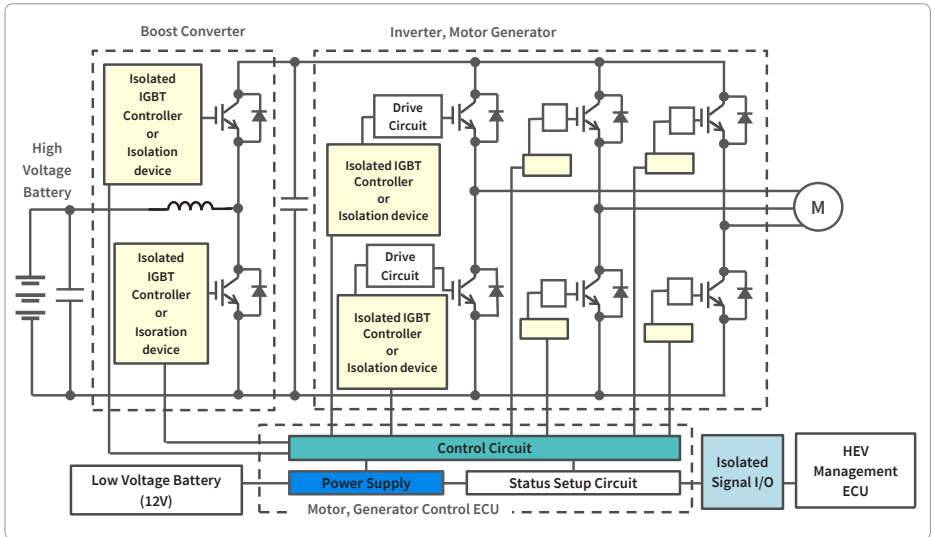
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Application 1. HEV / EV

1-1. Inverter, Motor Generator

System Block



Recommended Devices

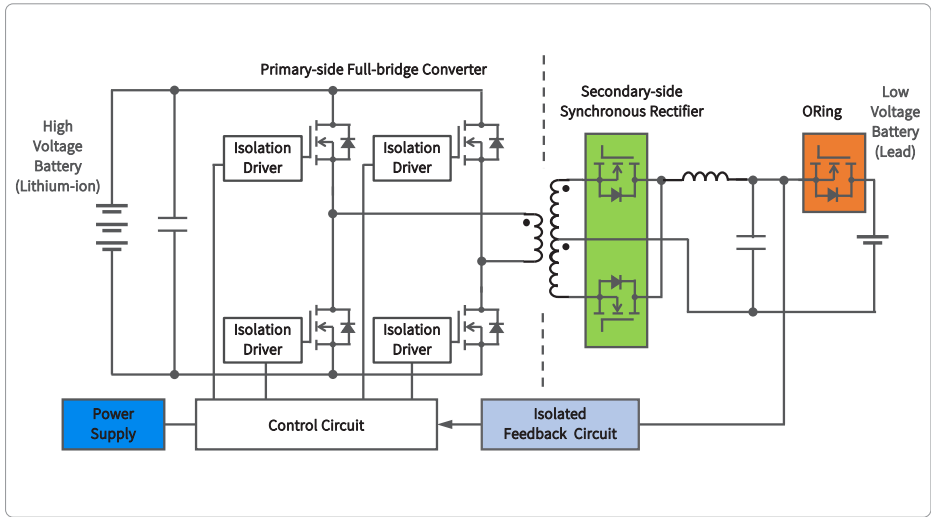
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Power Supply	MOSFET	DPAK+	TK45S06K3L	N-ch, 60 V / 45 A, 10.5 mΩ, T _{ch} =175 °C	AEC-Q101
			TJ60S06M3L	P-ch, -60 V / -60 A, 11.2 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH3R206NC	N-ch, 60 V / 70 A, 3.2 mΩ, T _{ch} =175 °C	AEC-Q101
			S1NL8*	P-ch, -60 V / (-90) A, (8.3) mΩ, T _{ch} =175 °C	**
		TSON Advance(WF)	XPN12006NC	N-ch, 60 V / 20 A, 12 mΩ, T _{ch} =175 °C	AEC-Q101
			S1NM1*	P-ch, -60 V / (-15) A, (45.5) mΩ, T _{ch} =175 °C	**
Isolated IGBT Controller or Isolation device	Photocoupler	5pin SO6	TLX9304	Open collector output, 1 M LOGIC, T _{opr} = -40 to 125 °C	AEC-Q101
			TLX9185A	Transistor output, T _{opr} = -40 to 125 °C	AEC-Q101
		4pin SO6	TLX9300	Transistor output with R _{BE} , T _{opr} = -40 to 125 °C	AEC-Q101
			TLX9291A	Transistor output, T _{opr} = -40 to 125 °C	AEC-Q101
Isolated Signal I/O	Photocoupler	5pin SO6	TLX9000	Transistor output with R _{BE} , T _{opr} = -40 to 125 °C	AEC-Q101
			TLX9304	Open collector output, 1 M LOGIC, T _{opr} = -40 to 125 °C	AEC-Q101
			TLX9309	Open collector output, 1 M ANALOG, T _{opr} = -40 to 125 °C	AEC-Q101
			TLX9310	Totempole output, 5 M LOGIC, T _{opr} = -40 to 105 °C	AEC-Q101
Control Circuit	Logic IC	TSSOP20B	TC74VHC9363FT	Dual 3 bit buffer for control signal of High-side and Low-side circuits. T _{opr} = -40 to 125 °C	AEC-Q100 #
			TC74VHC9364FT	T _{opr} = -40 to 125 °C	
	Bipolar TR	PW-Mini	TTC019	NPN, 50 V / 5 A, V _{CE(sat)} =0.21 V, T _i =150 °C	**
			TTA011	PNP, -50 V / -5 A, V _{CE(sat)} =-0.27 V, T _i =150 °C	**

* Under Development (The specification is subject to change without notice), ** Under Consideration
Compliant with the reliability requirements of AEC-Q100.

Application 1. HEV / EV

1-2. DC-DC Converter

System Block



Recommended Devices

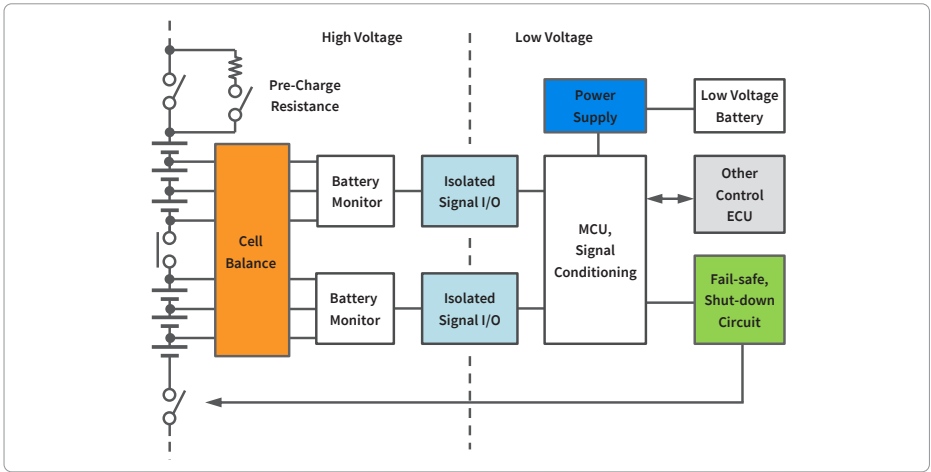
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Secondary-side Synchronous Rectifier	MOSFET	L-TOGL™	XPQ1R00AQB*	N-ch, 100 V / (300) A, (1.03) mΩ, T _{ch} =175 °C	**
		DSOP Advance(WF)L	XPW4R10ANB	N-ch, 100 V / 70 A, 4.1 mΩ, T _{ch} =175 °C	AEC-Q101
Power Supply	MOSFET	DPAK+	TJ60S06M3L	P-ch, -60 V / -60 A, 11.2 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH3R206NC	N-ch, 60 V / 70 A, 3.2 mΩ, T _{ch} =175 °C	AEC-Q101
		S1NL8*	P-ch, -60 V / (-90) A, (8.3) mΩ, T _{ch} =175 °C	**	
Isolated Feedback Circuit	Photocoupler	4pin SO6	TLX9185A	Transistor output, T _{opr} =-40 to 125 °C	AEC-Q101
			TLX9300	Transistor output with R _{BE} , T _{opr} =-40 to 125 °C	AEC-Q101
		SO4	TLX9291A	Transistor output, T _{opr} =-40 to 125 °C	AEC-Q101
			TLX9000	Transistor output with R _{BE} , T _{opr} =-40 to 125 °C	AEC-Q101
ORing	MOSFET	L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, T _{ch} =175 °C	**
		SOP Advance(WF)	XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, T _{ch} =175 °C	AEC-Q101

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 1. HEV / EV

1-3. Battery Management System (BMS)

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Power Supply	Bipolar Tr	New PW-Mold	TTB002	PNP, -60 V / -3 A, $V_{CE(sat)} = -1.7 \text{ V} @ -3 \text{ A}$, $T_j = 175^\circ \text{ C}$ For external of TB9005FNG	AEC-Q101
	MOSFET	DPAK+	TJ60S06M3L	P-ch, -60 V / -60 A, 11.2 m Ω , Tch=175 $^\circ \text{ C}$	AEC-Q101
		SOP Advance(WF)	XPH3R206NC	N-ch, 60 V / 70 A, 3.2 m Ω , Tch=175 $^\circ \text{ C}$	AEC-Q101
		S1NL8*		P-ch, -60 V / (-90) A, (8.3) m Ω , Tch=175 $^\circ \text{ C}$	**
		TSOP Advance(WF)	S1NM0*	P-ch, -60 V / (-25) A, (27.3) m Ω , Tch=175 $^\circ \text{ C}$	**
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
TB9045FNG series			Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100	
Fail-safe, Shut Down Circuit	IPD (HSS †)	WSON10	TPD1055FA	1ch High-side SW, $V_{DD(opr)} = 5$ to 18 V, $I_o = 3 \text{ A}$, 0.12 Ω $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q100
	IPD (LSS †)	PS-8	TPD1044F	1ch Low-side SW, $V_{OS} = 41 \text{ V}$, $I_o = 1 \text{ A}$, 0.6 Ω $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q100
Cell Balance	MOSFET	UF6	SSM6N24TU	N-chx2, 30 V / 0.5 A, 145 m Ω	AEC-Q101
			SSM6N39TU	N-chx2, 20 V / 1.6 A, 139 m Ω	AEC-Q101
			SSM6N62TU	N-chx2, 20 V / 0.8 A, 85 m Ω	AEC-Q101
			SSM6P39TU	P-chx2, -20 V / -1.5 A, 294 m Ω	AEC-Q101
			SSM3K376R	N-ch, 30 V / 4.0 A, 56 m Ω	AEC-Q101
	Photorelay	4pin SO6	TLX9175J	$V_{OFF} = 600 \text{ V}$, $T_{opr} = 55$ to 105 $^\circ \text{ C}$	AEC-Q101
SO16L-T		TLX9160T	$V_{OFF} = 1500 \text{ V}$, $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q101	
Isolated Signal I/O	Photocoupler	5pin SO6	TLX9304	Open collector output, 1 M LOGIC, $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q101
			TLX9309	Open collector output, 1 M ANALOG, $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q101
			TLX9310	Totempole output, 5 M LOGIC, $T_{opr} = -40$ to 105 $^\circ \text{ C}$	AEC-Q101
			TLX9378	Open collector output, 10 M LOGIC, $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q101
			TLX9376	Totempole output, 20 M LOGIC, $T_{opr} = -40$ to 125 $^\circ \text{ C}$	AEC-Q101
Other Control ECU	Stepping Motor Driver	P-VQFN28	TB9120AFTG	2-phase bipolar stepping motor driver with a clock input interface	AEC-Q100

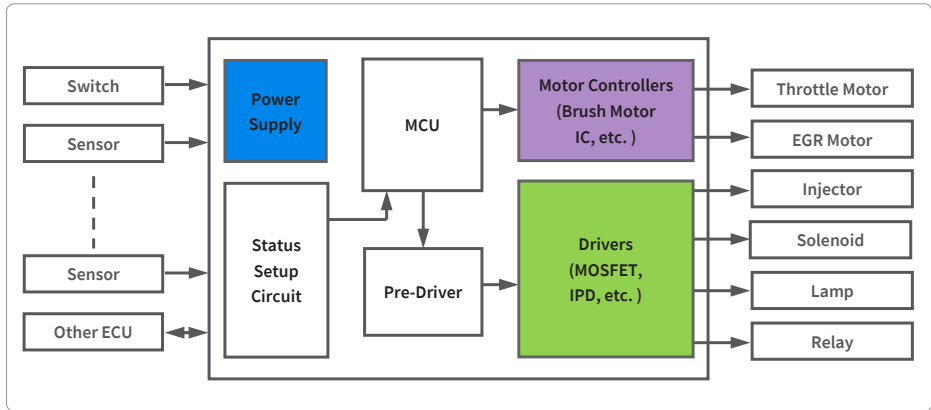
* Under Development (The specification is subject to change without notice.), ** Under Consideration

† HSS = High-Side Switch, ‡ LSS = Low-Side Switch

Application 2. Power Train

2-1. Gasoline Engine System

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Drivers for Injector, Solenoid, Lamp, etc.	MOSFET	DPAK+	TK25S06N1L	N-ch, 60 V / 25 A, 18.5 mΩ, Tch=175 °C	AEC-Q101
			TK40S06N1L	N-ch, 60 V / 40 A, 10.5 mΩ, Tch=175 °C	AEC-Q101
		SOP Advance(WF)	S1NL9*	P-ch, -60 V / (-55) A, (13) mΩ, Tch=175 °C	**
		TSON Advance(WF)	XPNI2006NC	N-ch, 60 V / 20 A, 12 mΩ, Tch=175 °C	AEC-Q101
				S1NM0*	P-ch, -60 V / (-25) A, (27.3) mΩ, Tch=175 °C
	IPD (HSS ‡)	WSON10	TPD1055FA	1ch High-side SW, V _{DD(opr)} = 5 to 18 V, I _o =3 A, 0.12 Ω T _{opr} : -40 to 125 °C	AEC-Q100
Motor Controllers	IPD (LSS #)	PS-8	TPD1044F	1ch Low-side SW, V _{DS} =40 V, I _o =1 A, 0.6 Ω T _{opr} : -40 to 125 °C	AEC-Q100
	MCD	P-QFN28	TB9051FTG	1ch H-Bridge driver(P-ch+N-ch), I _{out} =±5 A T _{opr} : -40 to 125 °C	AEC-Q100
Power Supply	MOSFET	DPAK+	TJ8S06M3L	P-ch, -60 V / -8 A, 104 mΩ, Tch=175 °C	AEC-Q101
			Bipolar TR	New PW-Mold	TTB002
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

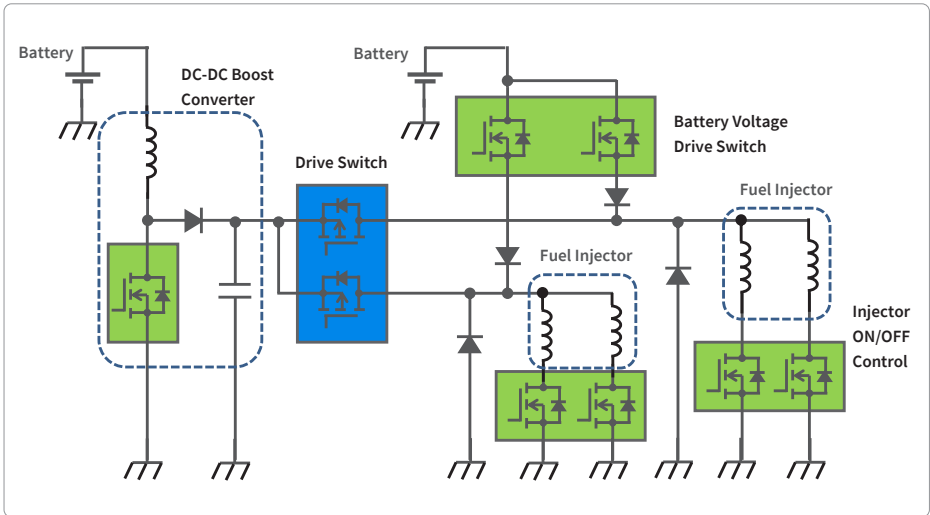
* Under Development (The specification is subject to change without notice.), ** Under Consideration

‡ HSS = High-Side Switch, # LSS = Low-Side Switch

Application 2. Power Train

2-2. Direct Injection Engine System

■ System Block



■ Recommended Devices

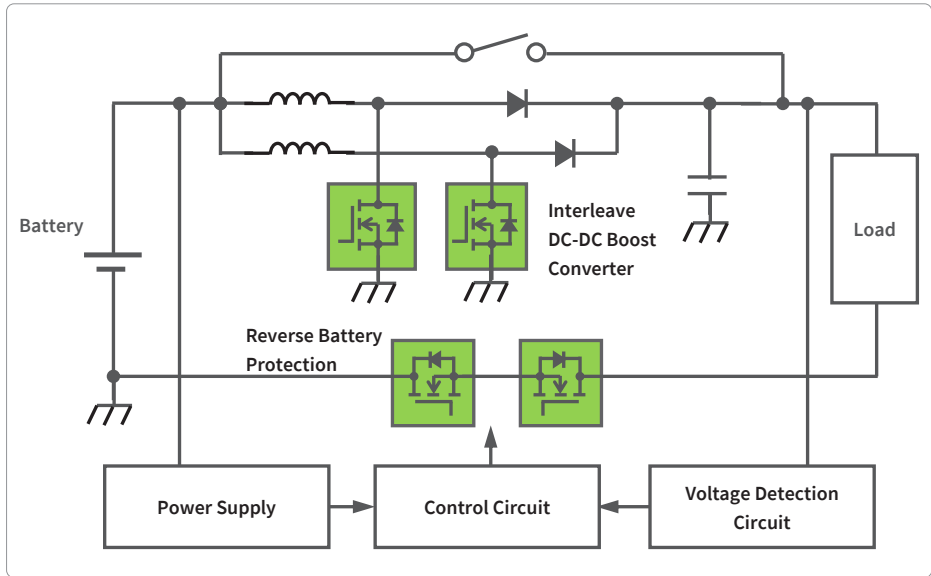
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Boost Converter, Injector Control, Battery Voltage Drive Switch	MOSFET	SOP Advance(WF)	XPH6R30ANB	N-ch, 100 V / 45 A, 6.3mΩ, T _{ch} =175 °C	AEC-Q101
			XPH4R10ANB	N-ch, 100 V / 70 A, 4.1mΩ, T _{ch} =175 °C	AEC-Q101
		TSON Advance(WF)	XPN7R104NC	N-ch, 40 V / 20 A, 7.1mΩ, T _{ch} =175 °C	AEC-Q101
			XPN12006NC	N-ch, 60 V / 20 A, 12mΩ, T _{ch} =175 °C	AEC-Q101
			XPN1300ANC	N-ch, 100 V / 30 A, 13.3mΩ, T _{ch} =175 °C	AEC-Q101
Drive Switch	MOSFET	DPAK+	TJ30S06M3L	P-ch, -60 V / -30 A, 21.8 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	S1N19*	P-ch, -60 V / -60 A, 13 mΩ, T _{ch} =175 °C	**
			XPN19014MC*	P-ch, -40 V / (-20) A, (18.7) mΩ, T _{ch} =175 °C	**
		TSON Advance(WF)	XPN9R614MC	P-ch, -40 V / -40 A, 9.6 mΩ, T _{ch} =175 °C	AEC-Q101
			S1NM0*	P-ch, -60 V / (-25) A, (27.3) mΩ, T _{ch} =175 °C	**
Motor Controllers	MCD	P-QFN28	TB9051FTG	1ch H-Bridge driver(P-ch+N-ch), I _{out} =±5 A, T _{opr} : -40 to 125 °C	AEC-Q100
Power Supply	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

* Under Development (The specification is subject to change without notice), ** Under Consideration

Application 2. Power Train

2-3. Idling Stop DC-DC Converter

System Block



Recommended Devices

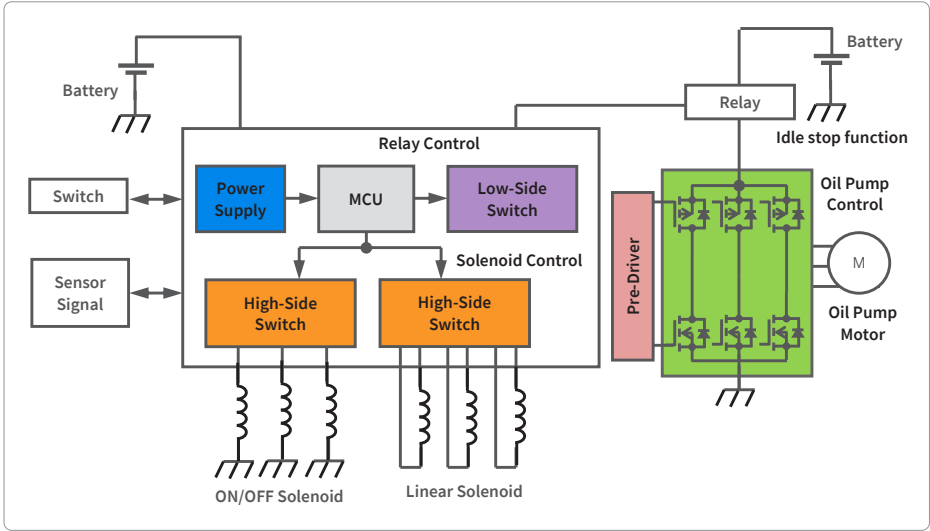
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Boost Converter, Reverse Battery Protection	MOSFET	SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 mΩ, T _{ch} =175 °C	AEC-Q101
			XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, T _{ch} =175 °C	AEC-Q101
			XPH4R10ANB	N-ch, 100 V / 70 A, 4.1 mΩ, T _{ch} =175 °C	AEC-Q101
		L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, T _{ch} =175 °C	**
			XPQ1R00AQB*	N-ch, 100 V / (300) A, (1.03) mΩ, T _{ch} =175 °C	**
			IPD (Gate Driver)	PS-8	TPD7104AF
	SSOP16	TPD7106F		1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
	WSO10A	TPD7107F		1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 125 °C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 2. Power Train

2-4. Transmission Control

System Block



Recommended Devices

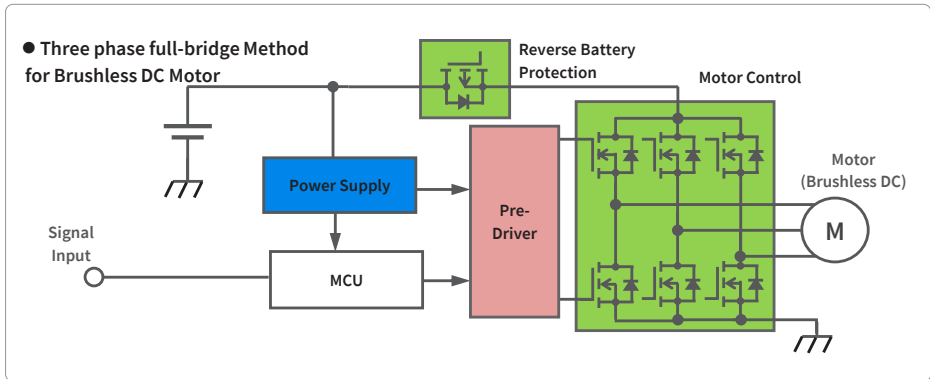
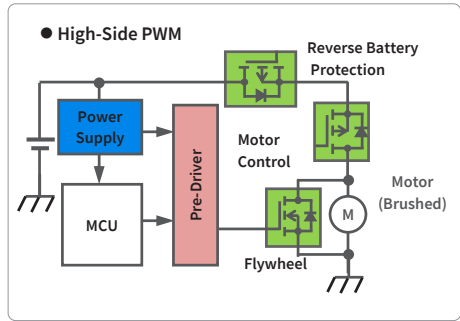
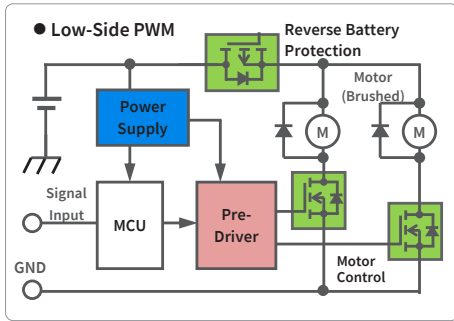
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Solenoid Control	IPD (HSS ‡)	WSON10	TPD1055FA	1ch High-side SW, $V_{D(onpr)} = 5$ to 18 V, $I_o = 3$ A, 0.12Ω $T_{opr}: -40$ to 125°C	AEC-Q100
Relay Control	IPD (LSS #)	PS-8	TPD1044F	1ch Low-side SW, $V_{DS} = 41$ V, $I_o = 1$ A, 0.6Ω $T_{opr}: -40$ to 125°C	AEC-Q100
			TPD1054F	1ch Low-side SW, $V_{DS} = 40$ V, $I_o = 1$ A, 0.8Ω $T_{opr}: -40$ to 125°C	AEC-Q100
Oil Pump Control	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V / 65 A, 4.3 m Ω , $T_{ch} = 175^\circ\text{C}$	AEC-Q101
			TJ60S04M3L	P-ch, -40 V / -60 A, 6.3 m Ω , $T_{ch} = 175^\circ\text{C}$	AEC-Q101
		SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 m Ω , $T_{ch} = 175^\circ\text{C}$	AEC-Q101
			XPHR7904PS	N-ch, 40 V / 150 A, 0.79 m Ω , $T_{ch} = 175^\circ\text{C}$	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	PS-8	TPD7211F	Half-Bridge Pw-MOSFET Gate Driver, $T_{opr}: -40$ to 125°C	-
		WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three-Phase Full Bridge Pw-MOSFET Gate Driver, $T_{opr}: -40$ to 150°C	AEC-Q100
	MCD	SSOP24 -0.65	TB9061AFNG	Three-Phase Brushless Sensor-less Pre-Driver $T_{opr}: -40$ to 125°C	AEC-Q100
Power Supply	MOSFET	TSOP Advance(WF)	XPN19014MC*	P-ch, -40 V / (-20) A, (18.7) m Ω , $T_{ch} = 175^\circ\text{C}$	**
			XPN9R614MC	P-ch, -40 V / -40 A, 9.6 m Ω , $T_{ch} = 175^\circ\text{C}$	AEC-Q101
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

‡ HSS = High-Side Switch, # LSS = Low-Side Switch

Application 2. Power Train 2-5. Cooling Fan

System Block



Recommended Devices

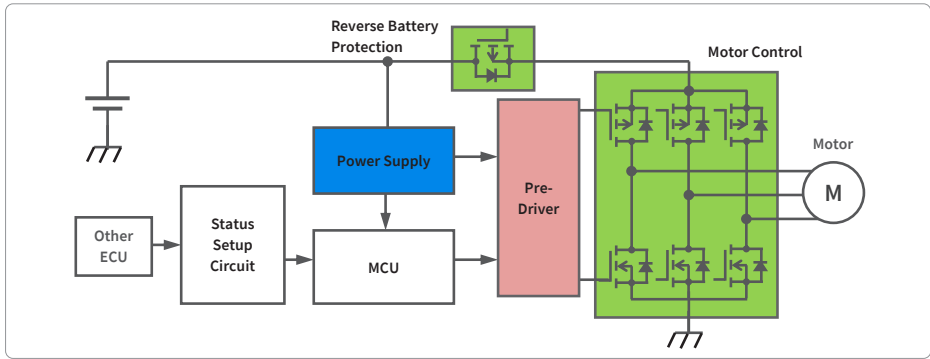
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control Reverse Battery Protection	MOSFET	DPAK+	TK1R4S04PB	N-ch, 40 V / 120 A, 1.35 mΩ, T _{ch} =175 °C	AEC-Q101
			TK90S06N1L	N-ch, 60 V / 90 A, 3.3 mΩ, T _{ch} =175 °C	AEC-Q101
		DSOP Advance(WF)M	TPWR1R104PB	N-ch, 40 V / 120 A, 1.14 mΩ, T _{ch} =175 °C	AEC-Q101
		DSOP Advance(WF)L	TPWR7904PB	N-ch, 40 V / 150 A, 0.79 mΩ, T _{ch} =175 °C	AEC-Q101
			XPW4R10ANB	N-ch, 100 V / 70 A, 4.1 mΩ, T _{ch} =175 °C	AEC-Q101
		L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, T _{ch} =175 °C	**
			XPQR8308QB*	N-ch, 80 V / (350) A, (0.83) mΩ, T _{ch} =175 °C	**
	XPQ1R00AQB*	N-ch, 100 V / (300) A, (1.03) mΩ, T _{ch} =175 °C	**		
Pre-Driver	IPD	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three-Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
	MCD	SSOP24	TB9061AFNG	3Phase Brushless Sensor-less Pre-Driver, T _{opr} : -40 to 125 °C	AEC-Q100
			TB9062FNG	Three Phase Brushless Sensor-less Pre-Driver, T _{opr} : -40 to 125 °C Automatic PWM duty control at startup, Automatic soft speed changing control	-
		LQFP64	TB9080FG	Pre-driver for sine-wave control T _{opr} : -40 to 125 °C Motor RPM feedback, auto lead angle correction	AEC-Q100
	Logic IC	TSSOP20B	TC74VHC9363FT TC74VHC9364FT	Dual 3 bit buffer for control signal of High-side and Low-side circuits. T _{opr} :-40 to 125 °C	AEC-Q100 #
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V / -3 A, V _{CE(sat)} =-1.7 V, T _j =175 °C For external of TB9005FNG	AEC-Q101

* Under Development (The specification is subject to change without notice.), ** Under Consideration
Compliant with the reliability requirements of AEC-Q100.

Application 2. Power Train

2-6. Various Pump (Brushless Motor)

System Block



Recommended Devices

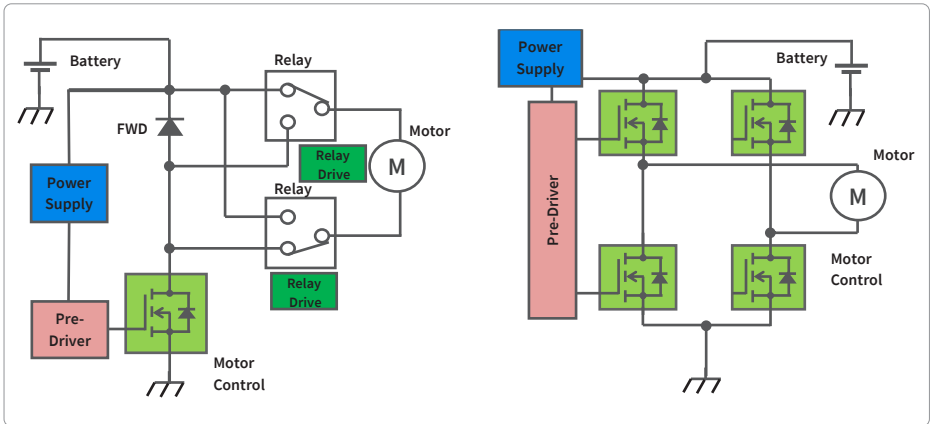
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control, Reverse Battery Protection	MOSFET	DPAK+	TK35S04K3L	N-ch, 40 V / 35 A, 10.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TK65S04N1L	N-ch, 40 V / 65 A, 4.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TJ40S04M3L	P-ch, -40 V / -40 A, 9.1 mΩ, T _{ch} =175 °C	AEC-Q101
			TJ60S04M3L	P-ch, -40 V / -60 A, 6.3 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH3R304PS	N-ch, 40 V / 40 A, 3.3 mΩ, T _{ch} =175 °C	AEC-Q101
			XPH4R714MC	P-ch, -40 V / -60 A, 4.7mΩ, T _{ch} =175 °C	AEC-Q101
			XPN9R614NC	N-ch, 40 V / 20 A, 7.1 mΩ, T _{ch} =175 °C	AEC-Q101
TSOP Advance(WF)	XPN9R614MC	P-ch, -40 V / -40 A, 9.6mΩ, T _{ch} =175 °C	AEC-Q101		
		IPD (Pre-Driver)	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three-Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C
Pre-Driver	MCD		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C
		SSOP24	TB9061AFNG	Three-Phase Brushless Sensor-less Pre-Driver, T _{opr} : -40 to 125 °C	AEC-Q100
			TB9062FNG	Three-Phase Brushless Sensor-less Pre-Driver, T _{opr} : -40 to 125 °C Automatic PWM duty control at startup, Automatic soft speed changing control	-
		SSOP24	TB9067FNG	Pre-drivers of P-ch / N-ch T _{opr} : -40 to 125 °C with 120 degree commutation,	-
	LQFP64	TB9080FG	Pre-driver for sine-wave control T _{opr} : -40 to 125 °C Motor RPM feedback, auto lead angle correction	AEC-Q100	
Logic IC	TSSOP20B	TC74VHC9363FT	Dual 3 bit buffer for control signal of High-side and Low-side circuits. T _{opr} =-40 to 125 °C	AEC-Q100 #	
		TC74VHC9364FT			
Power Supply	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V / -3 A, V _{CE(sat)} =-1.7 V, T _J =175 °C For external of TB9005FNG	AEC-Q101
	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration
Compliant with the reliability requirements of AEC-Q100.

Application 3. Body Control

3-1. Wiper

System Block



Recommended Devices

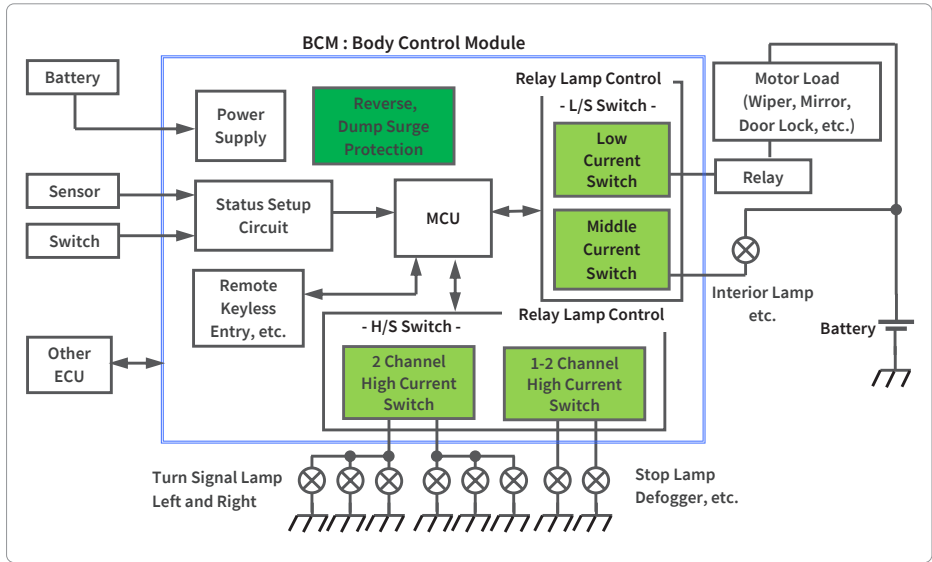
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control	MOSFET	DPAK+	TJ30S06M3L	P-ch, -60 V / -30 A, 21.8 mΩ, T _{ch} =175 °C	AEC-Q101
			TK8S06K3L	N-ch, 60 V / 8 A, 54 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH3R206NC	N-ch, 60 V / 70 A, 3.2 mΩ, T _{ch} =175 °C	AEC-Q101
			XPH2R106NC	N-ch, 60 V / 110 A, 2.1 mΩ, T _{ch} =175 °C	AEC-Q101
			XPH3R304PS	N-ch, 40 V / 60 A, 3.3 mΩ, T _{ch} =175 °C	AEC-Q101
TSON Advance(WF)	XPN3R804NC	N-ch, 40 V / 40 A, 3.8 mΩ, T _{ch} =175 °C	AEC-Q101		
Relay drive	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V / 2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V / 2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
UFM	SSM3H137TU	Active Clamp N-ch, 34 V / 2 A, 0.24 Ω	AEC-Q101		
Pre-Driver	IPD (Pre-Driver)	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	**
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V / -3 A, V _{CE(sat)} =-1.7 V, T _J =175 °C	AEC-Q101

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 3. Body Control

3-2. Body Control Module (BCM)

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Relay, Lamp Control	IPD (HSS ‡)	WSON10	TPD1055FA	1ch High-side SW, $V_{DD(opr)} = 5$ to 18 V, $I_o = 3$ A, 0.12Ω $T_{opr}: -40$ to 125°C	AEC-Q100
	IPD (LSS #)	PS-8	TPD1044F	1ch Low-side SW, $V_{DS} = 41$ V, $I_o = 1$ A, 0.6Ω $T_{opr}: -40$ to 125°C	AEC-Q100
		WSON10	TPD1058FA	1ch Low-side SW, $V_{DS} = 40$ V, $I_o = 6$ A, 0.1Ω $T_{opr}: -40$ to 125°C	AEC-Q100
	MOSFET	SOT-23F	SSM3K2615R	N-ch, 60 V / 2 A, 0.3Ω	AEC-Q101
			SSM3K337R	Active Clamp N-ch, 38 V / 2 A, 0.15Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V / 2 A, 0.34Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V / 0.65 A, 1.8Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V / 0.65 A, 1.8Ω	AEC-Q101
UFM	SSM3H137TU	Active Clamp N-ch, 34 V / 2 A, 0.24Ω	AEC-Q101		
Reverse Dump Surge Protection	MOSFET	DPAK+	TK60S10N1L	N-ch, 100 V / 60 A, $6.11 \text{ m}\Omega$, $T_{ch} = 175^\circ\text{C}$	AEC-Q101
			TJ60S06M3L	P-ch, -60 V / -60 A, $11.2 \text{ m}\Omega$, $T_{ch} = 175^\circ\text{C}$	AEC-Q101
		SOP Advance(WF)	XPH6R30ANB	N-ch, 100 V / 45 A, $6.3 \text{ m}\Omega$, $T_{ch} = 175^\circ\text{C}$	AEC-Q101
			XPH4R10ANB	N-ch, 100 V / 70 A, $4.1 \text{ m}\Omega$, $T_{ch} = 175^\circ\text{C}$	AEC-Q101
			S1NL8*	P-ch, -60 V / (-90) A, $(8.8) \text{ m}\Omega$, $T_{ch} = 175^\circ\text{C}$	**
	IPD (Pre-Driver)	SSOP16	TPD7106F	1ch High-Side N-ch Power MOSFET Gate Driver, $T_{opr}: -40$ to 150°C	AEC-Q100
Control Signal Line	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	$V_{RMW} = 12$ V, $C_1 = 9$ pF, $V_{ESD} = \pm 30$ kV, Bidirectional	AEC-Q101
			DF2B29FU	$V_{RMW} = 24$ V, $C_1 = 9$ pF, $V_{ESD} = \pm 25$ kV, Bidirectional	AEC-Q101
			DF2B36FU	$V_{RMW} = 28$ V, $C_1 = 6.5$ pF, $V_{ESD} = \pm 25$ kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	$V_{RMW} = 12$ V, $C_1 = 9$ pF, $V_{ESD} = \pm 30$ kV, Bidirectional	AEC-Q101
			DF3D29FU	$V_{RMW} = 24$ V, $C_1 = 9$ pF, $V_{ESD} = \pm 25$ kV, Bidirectional	AEC-Q101
			DF3D36FU	$V_{RMW} = 28$ V, $C_1 = 6.5$ pF, $V_{ESD} = \pm 25$ kV, Bidirectional	AEC-Q101
	MCD	P-QFN28	TB9051FTG	1ch H-Bridge driver(P-ch+N-ch), $I_{out} = \pm 5$ A, $T_{opr}: -40$ to 125°C	AEC-Q100
	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, $T_{opr}: -40$ to 125°C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

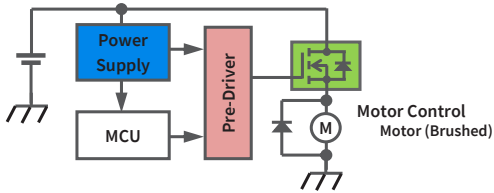
‡ HSS = High-Side Switch, # LSS = Low-Side Switch

Application 3. Body Control

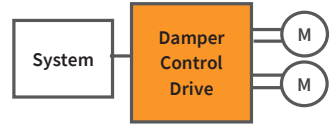
3-3. Air Conditioner (HVAC)

System Block

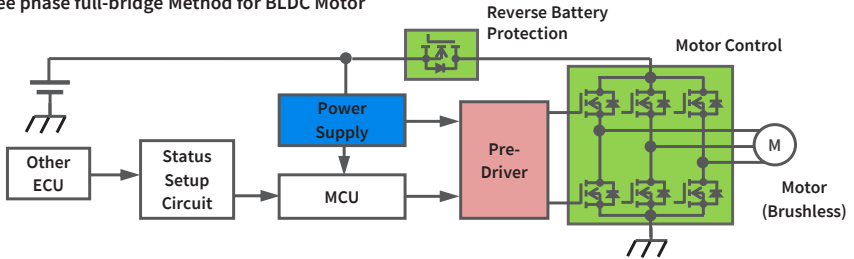
● PWM Control Method for Brushed Motor



● Damper



● Three phase full-bridge Method for BLDC Motor



Recommended Devices

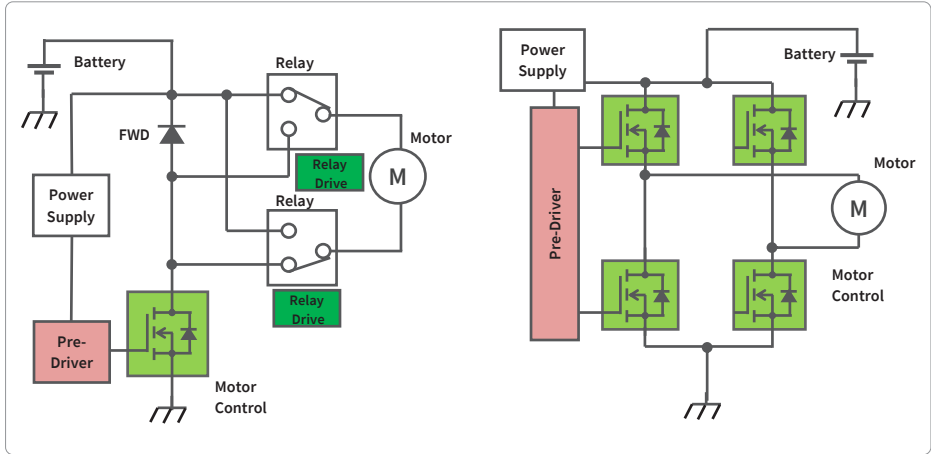
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control, Reverse Battery Protection	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V / 65 A, 4.3 mΩ, Tch=175 °C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V / 120 A, 1.35 mΩ, Tch=175 °C	AEC-Q101
			TK60S06K3L	N-ch, 60 V / 60 A, 8.0 mΩ, Tch=175 °C	AEC-Q101
			TK90S06N1L	N-ch, 60 V / 90 A, 3.3 mΩ, Tch=175 °C	AEC-Q101
		SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 mΩ, Tch=175 °C	AEC-Q101
			XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, Tch=175 °C	AEC-Q101
		L-TOGL™	XPH4R10ANB	N-ch, 100 V / 70 A, 4.1 mΩ, Tch=175 °C	AEC-Q101
			XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, Tch=175 °C	**
	XPQ1R00AQB*	N-ch, 100 V / (300) A, (1.03) mΩ, Tch=175 °C	**		
Pre-Driver/Driver	IPD (Pre-Driver)	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
	MCD	LQFP64	TB9080FG	Pre-driver for sine-wave control T _{opr} : -40 to 125 °C Motor RPM feedback, auto lead angle correction	AEC-Q100
		P-VQFN28	TB9120AFTG	2-phase bipolar stepping motor driver with a clock input interface, T _{opr} : -40 to 125 °C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V / -3 A, V _{CE(sat)} =-1.7 V, T _J =175 °C For external of TB9005FNG	AEC-Q101
Damper Control Driver	MCD	SSOP24	TB9101FNG	2-CH H-bridge driver, Diagnostic function, standby function, T _{opr} : -40 to 125 °C	AEC-Q100
			TB9102FNG	6-CH Half / 3-CH H-bridge driver, SPI communications, Diagnostic function, T _{opr} : -40 to 125 °C	AEC-Q100
			TB9056FNG	LIN 1.3 Slave (Classic Check sum) H-Bridge driver	-
			TB9058FNG	Built-in 1ch H-bridge, communicate with LIN 2.0 master, as a slave IC	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 3. Body Control

3-4. Power Door / EPB

System Block



Recommended Devices

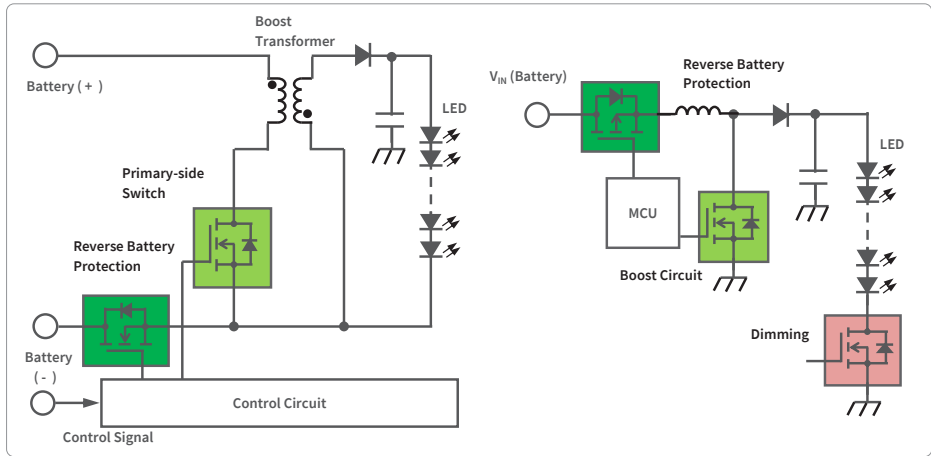
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V / 65 A, 4.3 mΩ, Tch=175 °C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V / 120 A, 1.35 mΩ, Tch=175 °C	AEC-Q101
			TK90S06N1L	N-ch, 60 V / 90 A, 3.3 mΩ, Tch=175 °C	AEC-Q101
			TJ80S04M3L	P-ch, -40 V / -80 A, 5.2 mΩ, Tch=175 °C	AEC-Q101
		SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 mΩ, Tch=175 °C	AEC-Q101
			XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, Tch=175 °C	AEC-Q101
L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, Tch=175 °C	**		
Relay drive	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V / 2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V / 2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V / 2 A, 0.24 Ω	AEC-Q101
Driver/Pre-Driver	IPD (Pre-Driver)	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
		PS-8	TPD7211F	Half-Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 125 °C	-
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	**
	MCD	HTSSOP48	TB9052FNG	H-Bridge Pre-Driver, Current sensor, T _{opr} : -40 to 125 °C	AEC-Q100
		LQFP48	TB9057FG	H-Bridge Pre-Driver, Current sensor, T _{opr} : -40 to 125 °C	AEC-Q100
		LQFP64	TB9080FG	Pre-driver for sine-wave control T _{opr} : -40 to 125 °C Motor RPM feedback, auto lead angle correction	AEC-Q100
		LQFP64	TB9081FG	Three-Phase Brushless Motor Pre-driver T _{opr} : -40 to 125 °C 5-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	AEC-Q100
		P-VQFN48	TB9083FTG	3-Phase Brushless Motor Pre-driver 3-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, T _j =175 °C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 3. Body Control

3-5. LED Head Lamp

System Block



1. HEV/EV

2. Power Train

3. Body Control

4. Active/Passive Safety

5. Others

Recommended Devices

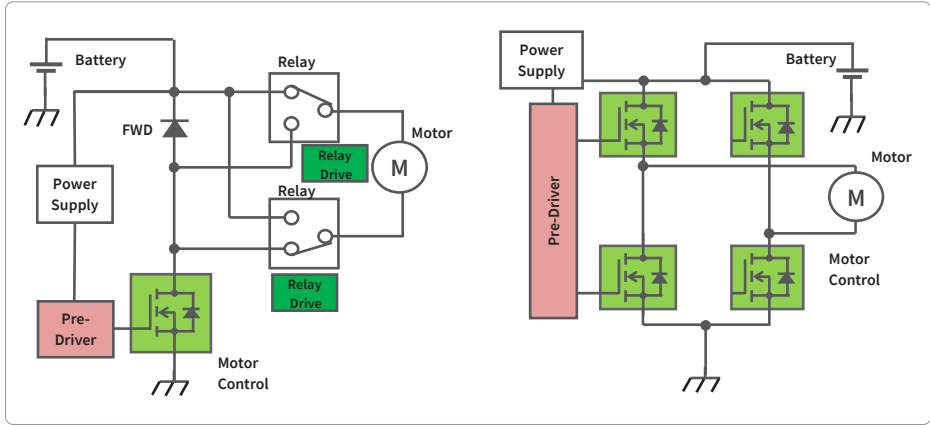
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Booster Circuit	MOSFET	DPAK+	TK25S06N1L	N-ch, 60 V / 25 A, 18.5 mΩ, T _{ch} =175 °C	AEC-Q101
			TK90S06N1L	N-ch, 60 V / 90 A, 3.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TK60S10N1L	N-ch, 100 V / 60 A, 6.11 mΩ, T _{ch} =175 °C	AEC-Q101
		TSOP Advance(WF)	XPN6R706NC	N-ch, 60 V / 40 A, 6.7 mΩ, T _{ch} =175 °C	AEC-Q101
			XPN1300ANC	N-ch, 100 V / 30 A, 13.3mΩ, T _{ch} =175 °C	AEC-Q101
Reverse Battery Protection	MOSFET	DPAK+	TK35S04K3L	N-ch, 40 V / 35 A, 10.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TK25S06N1L	N-ch, 60 V / 25 A, 18.5 mΩ, T _{ch} =175 °C	AEC-Q101
			TJ40S04M3L	P-ch, -40V / -40A, 9.1mΩ, T _{ch} =175 °C	AEC-Q101
			TJ30S06M3L	P-ch, -60 V / -30 A, 21.8 mΩ, T _{ch} =175 °C	AEC-Q101
			XPN7R104NC	N-ch, 40 V / 20 A, 7.1 mΩ, T _{ch} =175 °C	AEC-Q101
		TSOP Advance(WF)	XPN12006NC	N-ch, 60 V / 20 A, 12 mΩ, T _{ch} =175 °C	AEC-Q101
			XPN9R614MC	P-ch, -40 V / -40 A, 9.6 mΩ, T _{ch} =175 °C	AEC-Q101
			S1NM0*	P-ch, -60 V / (-25) A, (27.3) mΩ, T _{ch} =175 °C	**
			SSM3K341R	N-ch, 60 V / 6 A, 36 mΩ, T _{ch} =175 °C	AEC-Q101
		SOT-23F	SSM3K361R	N-ch, 100 V / 3.5 A, 69 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM3J356R	P-ch, -60 V / -2 A, 300 mΩ	AEC-Q101
			SSM3J351R	P-ch, -60 V / -3.5 A, 134 mΩ	AEC-Q101
		TSOP6F	SSM6K804R	N-ch, 40 V / 12 A, 7 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6K809R	N-ch, 60 V / 6 A, 36 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6K810R	N-ch, 100 V / 3.5 A, 69 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6K819R	N-ch, 100 V / 10 A, 25.8 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6J808R	P-ch, -40V / -7 A, 35 mΩ	AEC-Q101
			SSM6J811R*	P-ch, -60V / -4 A, 164 mΩ	**
			SSM6J811R*	P-ch, -60V / -4 A, 164 mΩ	**
Dimming	MOSFET	SOT-23F	SSM3J356R	P-ch, -60 V / -2 A, 300 mΩ	AEC-Q101
			SSM3J351R	P-ch, -60 V / -3.5 A, 134 mΩ	AEC-Q101
			SSM3K341R	N-ch, 60 V / 6 A, 36 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM3K361R	N-ch, 100 V / 3.5 A, 69 mΩ, T _{ch} =175 °C	AEC-Q101
		TSOP6F	SSM6K809R	N-ch, 60 V / 6 A, 36 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6K810R	N-ch, 100 V / 3.5 A, 69 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6K819R	N-ch, 100 V / 10 A, 25.8 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6J811R*	P-ch, -60V / -4 A, 134 mΩ	**
Control Signal Line	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V _{RMW} =12 V, C _i =9 pF, V _{ESD} =±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V _{RMW} =24 V, C _i =9 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V _{RMW} =28 V, C _i =6.5 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V _{RMW} =12 V, C _i =9 pF, V _{ESD} =±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V _{RMW} =24 V, C _i =9 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V _{RMW} =28 V, C _i =6.5 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
	MCD	P-VQFN28	TB9120AFTG	2-phase bipolar stepping motor driver with a clock input interface, T _{opr} : -40 to 125 °C	AEC-Q100

* Under Development (The specification is subject to change without notice), ** Under Consideration

Application 4. Active / Passive Safety

4-1. Pre-Crash Seat Belt

System Block



Recommended Devices

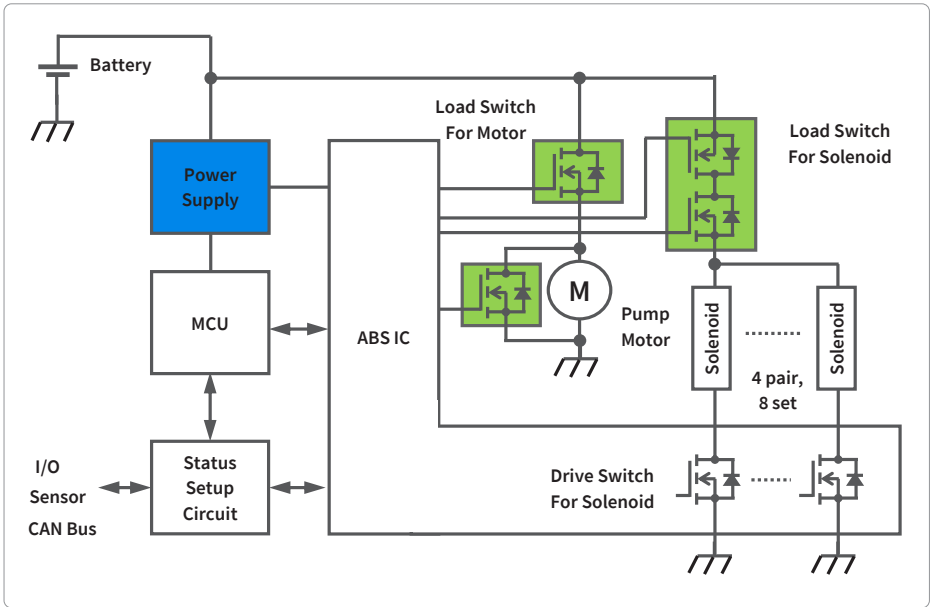
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control	MOSFET	DPAK+	TK6S04N1L	N-ch, 40 V / 65 A, 4.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V / 120 A, 1.35 mΩ, T _{ch} =175 °C	AEC-Q101
			TK90S06N1L	N-ch, 60 V / 90 A, 3.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TJ80S04M3L	P-ch, -40 V / -80 A, 5.2 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 mΩ, T _{ch} =175 °C	AEC-Q101
			XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, T _{ch} =175 °C	AEC-Q101
		DSOP Advance(WF)M	S1NL8*	P-ch, -60 V / (-90) A, (8.3) mΩ, T _{ch} =175 °C	**
			TPW1R104PB	N-ch, 40 V / 120 A, 1.14 mΩ, T _{ch} =175 °C	AEC-Q101
DSOP Advance(WF)L	TPWR7904PB	N-ch, 40 V / 150 A, 0.79 mΩ, T _{ch} =175 °C	AEC-Q101		
L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, T _{ch} =175 °C	**		
Relay drive	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V / 2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V / 2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V / 2 A, 0.24 Ω	AEC-Q101
Driver/ Pre-Driver	IPD (Pre-Driver)	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
		PS-8	TPD7211F	Half-Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 125 °C	-
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	**
	MCD	HTSSOP48	TB9052FNG	H-Bridge Pre-Driver, Current sensor, T _{opr} : -40 to 125 °C	AEC-Q100
		LQFP48	TB9057FG	H-Bridge Pre-Driver, Current sensor, T _{opr} : -40 to 125 °C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 4. Active / Passive Safety

4-2. Brake (ABS, ESC)

■ System Block



■ Recommended Devices

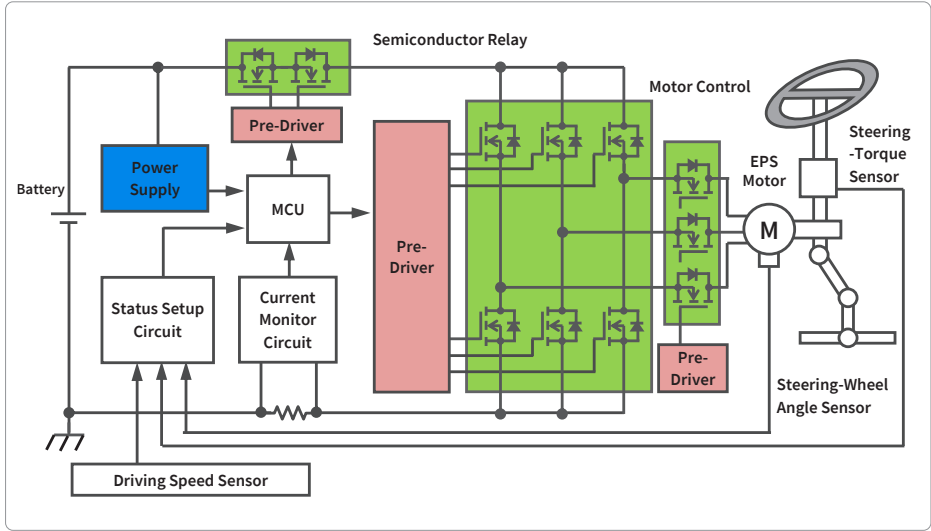
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Switch for Pump Motor, Solenoid	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V / 65 A, 4.3 mΩ, T _{ch} =175 °C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V / 120 A, 1.35 mΩ, T _{ch} =175 °C	AEC-Q101
			TK90S06N1L	N-ch, 60 V / 90 A, 3.3 mΩ, T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 mΩ, T _{ch} =175 °C	AEC-Q101
		DSOP Advance(WF)M	TPW1R104PB	N-ch, 40 V / 120 A, 1.14 mΩ, T _{ch} =175 °C	AEC-Q101
		L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, T _{ch} =175 °C	**
Driver/ Pre-Driver	MCD	LQFP64	TB9081FG	Three-Phase Brushless Motor Pre-driver T _{opr} : -40 to 125 °C 5-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	AEC-Q100
		P-VQFN48	TB9083FTG	3-Phase Brushless Motor Pre-driver 3-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, T _j =175 °C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

* Under development (The specification is subject to change without notice.), ** Under Consideration

Application 4. Active / Passive Safety

4-3. Electric Power Steering (EPS)

System Block



Recommended Devices

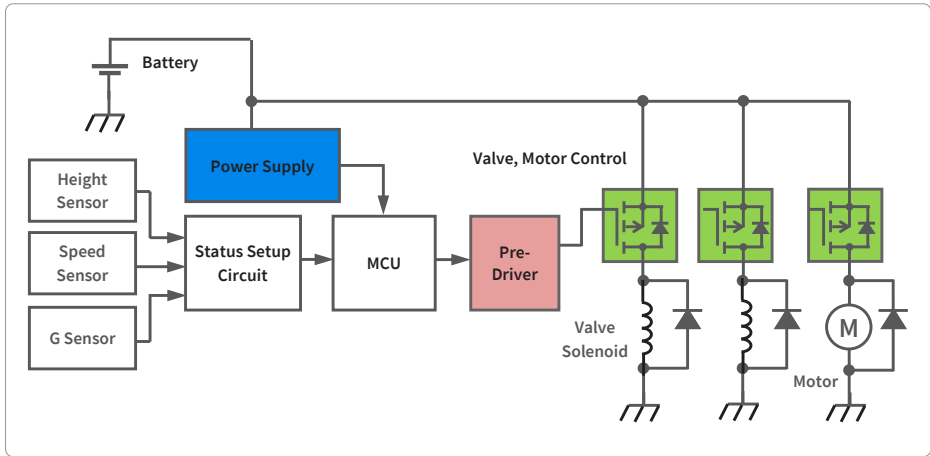
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified	
Motor Control, Semiconductor Relay	MOSFET	SOP Advance(WF)	XPH1R104PS	N-ch, 40 V / 120 A, 1.14 mΩ, Tch=175 °C	AEC-Q101	
			XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, Tch=175 °C	AEC-Q101	
		DSOP Advance(WF)M	TPWR1R104PB	N-ch, 40 V / 120 A, 1.14 mΩ, Tch=175 °C	AEC-Q101	
		DSOP Advance(WF)L	TPWR7904PB	N-ch, 40 V / 150 A, 0.79 mΩ, Tch=175 °C	AEC-Q101	
		L-TOGL™	XPQR3004PB*	N-ch, 40 V / (400) A, (0.3) mΩ, Tch=175 °C	**	
Pre-Driver	IPD (Pre-Driver)	WQFN32 / SSOP30	TPD7212F / TPD7212FN	Three Phase Full Bridge Pw-MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100	
		PS-8	TPD7104AF	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 125 °C	AEC-Q100	
		SSOP16	TPD7106F	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100	
		WSON10A	TPD7107F	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 125 °C	AEC-Q100	
	MCD	HTSSOP48	TB9052FNG	H-Bridge Pre-Driver, Current sensor, T _{opr} : -40 to 125 °C	AEC-Q100	
		LQFP48	TB9057FG	H-Bridge Pre-Driver, Current sensor, T _{opr} : -40 to 125 °C	AEC-Q100	
		LQFP64	TB9081FG	Three-Phase Brushless Motor Pre-driver T _{opr} : -40 to 125 °C 5-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	AEC-Q100	
		P-VQFN48	TB9083FTG	3-Phase Brushless Motor Pre-driver 3-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, T _j =175 °C	AEC-Q100	
	Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100
		System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
TB9045FNG series				Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100	
MOSFET		DPAK+	TJ8S06M3L	P-ch, -60 V / -8 A, 104 mΩ, Tch=175 °C For external of TB9042FTG	AEC-Q101	
		SOT-23F	SSM3K341R	N-ch, 60 V / 6 A, 36 mΩ, Tch=175 °C For external of TB9044FTG	AEC-Q101	
Bipolar TR		New PW-Mold	TTB002	PNP, -60 V / -3 A, V _{CE(sat)} =-1.7 V, T _j =175 °C For external of TB9005FNG	AEC-Q101	

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application 4. Active / Passive Safety

4-4. Electric Control Suspension

System Block



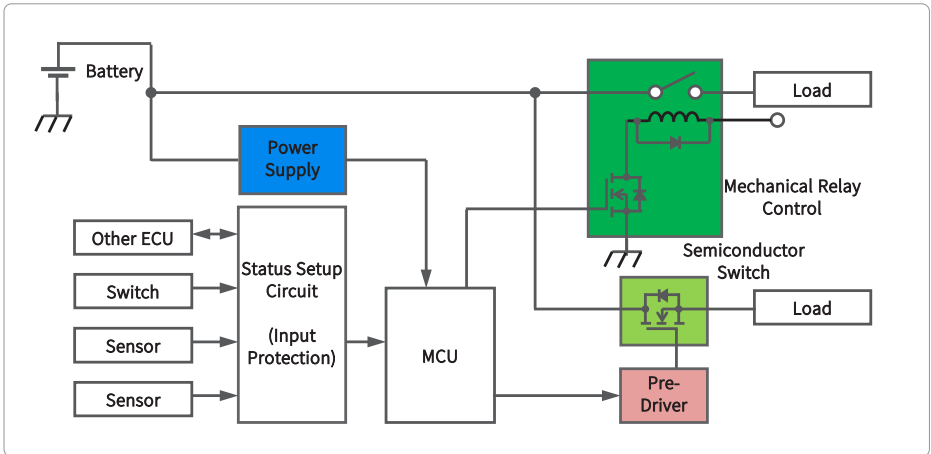
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Solenoid, Motor Control	MOSFET	TSON Advance(WF)	XPN7R104NC	N-ch, 40 V / 20 A, 7.1 mΩ, T _{ch} =175 °C	AEC-Q101
			XPN9R614MC	P-ch, - 40 V / -40 A, 9.6 mΩ, T _{ch} =175 °C	AEC-Q101
		SOT-23F	SSM3K2615R	N-ch, 60 V / 2 A, 300 mΩ	AEC-Q101
			SSM3K318R	N-ch, 60 V / 2.5 A, 107 mΩ	AEC-Q101
			SSM3K341R	N-ch, 60 V / 6 A, 36 mΩ, T _{ch} =175 °C	AEC-Q101
			SSM6K809R	N-ch, 60 V / 6 A, 36 mΩ, T _{ch} =175 °C	AEC-Q101
	TSOP6F	SSM6K810R	N-ch, 100 V / 3.5 A, 69 mΩ, T _{ch} =175 °C	AEC-Q101	
		SSM6K819R	N-ch, 100 V / 10 A, 25.8 mΩ, T _{ch} =175 °C	AEC-Q101	
Diode	S-FLAT™	CRG07	400 V / 0.7 A, V _{FM} =1.1 V@0.7 A, T _j =175 °C	AEC-Q101	
		CRG09B	400 V / 1.0 A, V _{FM} =1.1 V@0.7 A, T _j =150 °C	AEC-Q101	
Pre-Driver	IPD (Pre-Driver)	PS-8	TPD7104AF	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 125 °C	AEC-Q100
Power Supply	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

Application 5. Other

5-1. Junction Box

■ System Block



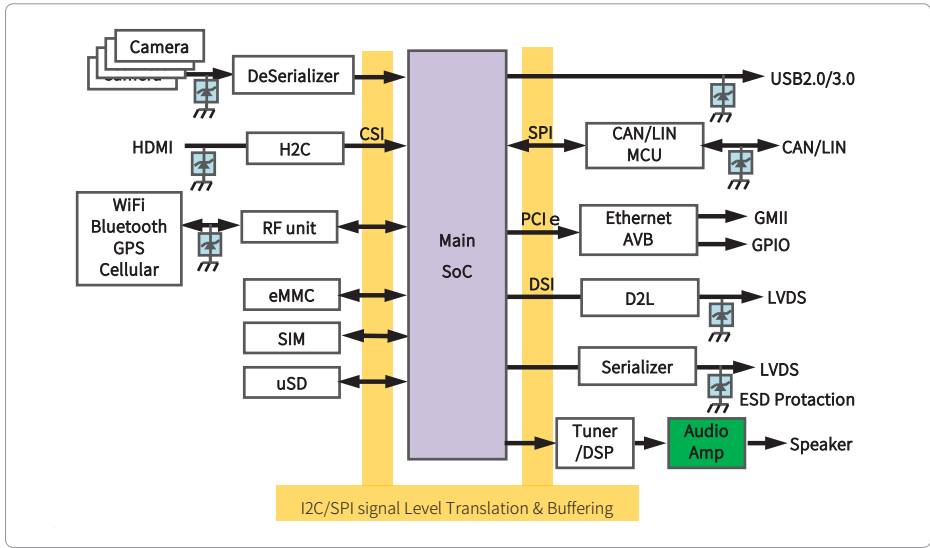
■ Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Mechanical Relay Control	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V / 2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V / 2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V / 0.65 A, 1.8 Ω	AEC-Q101
	Diode	S-FLAT™	UFM	SSM3H137TU	Active Clamp N-ch, 34 V / 2 A, 0.24 Ω
CRG09B			400 V / 1.0 A, V _{FM} =1.1 V@0.7 A, T _J =150 °C	AEC-Q101	
Semiconductor Relay	MOSFET	SOP Advance(WF)	XPHR7904PS	N-ch, 40 V / 150 A, 0.79 mΩ, T _{ch} =175 °C	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	PS-8	TPD7104AF	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 125 °C	AEC-Q100
		SSOP16	TPD7106F	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 150 °C	AEC-Q100
		WSOP10A	TPD7107F	1ch High-Side N-ch Power MOSFET Gate Driver, T _{opr} : -40 to 125 °C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T _{opr} : -40 to 125 °C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V / -3 A, V _{CE(sat)} =-1.7 V, T _J =175 °C For external of TB9005FNG	AEC-Q101
Control Signal Line	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V _{RMW} =12 V, C _i =9 pF, V _{ESD} =±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V _{RMW} =24 V, C _i =9 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V _{RMW} =28 V, C _i =6.5 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V _{RMW} =12 V, C _i =9 pF, V _{ESD} =±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V _{RMW} =24 V, C _i =9 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V _{RMW} =28 V, C _i =6.5 pF, V _{ESD} =±25 kV, Bidirectional	AEC-Q101

Application 5. Other

5-2. In Vehicle infotainment (IVI)

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
CAN/LIN LINE ESD protection	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	$V_{RMW}=12\text{ V}$, $C_i=9\text{ pF}$, $V_{ESD}=\pm 30\text{ kV}$, Bidirectional	AEC-Q101
			DF2B29FU	$V_{RMW}=24\text{ V}$, $C_i=9\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
			DF2B36FU	$V_{RMW}=28\text{ V}$, $C_i=6.5\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	$V_{RMW}=12\text{ V}$, $C_i=9\text{ pF}$, $V_{ESD}=\pm 30\text{ kV}$, Bidirectional	AEC-Q101
			DF3D29FU	$V_{RMW}=24\text{ V}$, $C_i=9\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
			DF3D36FU	$V_{RMW}=28\text{ V}$, $C_i=6.5\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
LVDS LINE ESD protection	SOD-923 (Single)	DF2S5M4FS	$V_{RMW}=3.6\text{ V}$, $C_i=0.45\text{ pF}$, $V_{ESD}=\pm 20\text{ kV}$, Unidirectional	AEC-Q101	
DF2S6M4FS		$V_{RMW}=5.5\text{ V}$, $C_i=0.45\text{ pF}$, $V_{ESD}=\pm 20\text{ kV}$, Unidirectional	AEC-Q101		
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, $T_{opr}: -40\text{ to }125\text{ }^\circ\text{C}$	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V / -3 A, $V_{CE(sat)}=-1.7\text{ V}@3\text{ A}$, $T_j=175\text{ }^\circ\text{C}$ For external of TB9005FNG	AEC-Q101
Signal Level Translation & Buffering	Logic IC	TSSOP16B	74LV4T125FT	4-Bit Single Power Supply Unidirection Level Shifter IC (Buffer Up and Down). Quadruple Buffer With 3-State Output. e.g. <UP Translation> <Down translation> 1.8 V→3.3 V@Vcc=3.3 V 3.3 V→1.8 V@Vcc=1.8 V 3.3 V→5.0 V@Vcc=5.0 V 5.0 V→3.3 V@Vcc=3.3 V	AEC-Q100 #
			74LV4T126FT		AEC-Q100 #
		TSSOP16B	TC7MP3125FT	4-Bit Dual-Supply Bus Transceiver. Bi-directional transmission possible by DIR terminal control. Translation voltage range is 1.1 to 3.6 V. (TC7MPN series are Low Noise Type.)	AEC-Q100 #
			TC7MPN3125FT		AEC-Q100 #
		US8	TC7WP3125FK	2-Bit Dual-Supply Bus Buffer. Uni-directional type level up conversion IC. (TC7WPN series is Low Noise Type.)	AEC-Q100 #
			TC7WPN3125FK		AEC-Q100 #

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Signal Level Translation Bus Switch	Bus Switch	TSSOP20	TC7MPB9307FT	8-Bit Dual Supply Bus Switch. Bi-directional transmission possible without direction control. Translation voltage range: 1.8 to 5.0V. Low Active.	AEC-Q100 #
			TSSOP14	TC7QP9306FT	4-Bit Dual Supply Bus Switch. Bi-directional transmission possible without direction control. Translation voltage range: 1.8 to 5.0V. 9306: High Active, 9307: Low Active.
		US8		TC7QP9307FT	
			TC7WPB9306FK	2-Bit Dual Supply Bus Switch. Bi-directional transmission possible without direction control. Translation voltage range: 1.8 to 5.0V. 9306: High Active, 9307: Low Active.	AEC-Q100 #
			TC7WPB9307FK		AEC-Q100 #
Ethernet Bridge IC	Bridge IC	PLFBGA170	TC9560XBG	Ethernet AVB, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INT	AEC-Q100
			TC9560BXBG	Ethernet AVB, HSIC I/F, RGMII/RMII/MII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INT	
		PLFBGA120	TC9562XBG	Ethernet AVB, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INT	
			TC9562AXBG	Ethernet AVB, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII/SGMII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INT	
		PFBGA220	TC9562BXBG	Ethernet TSN, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII/SGMII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INT	**
			TC9563XBG	Ethernet AVB&TSN, USXGMII/XFI/SGMII/RGMII, PCIe I/F Gen3.0(8GT/s) 3 ports switch Upstream Port: 4lane x 1port Downstream Port: 1lane x 2ports, I2C/SPI, UART, GPIO, INT	
Peripheral Bridge IC	H2C	P-LFBGA64	TC9590XBG	HDMI 1.4a → MIPI CS12 4 lanex1ch	AEC-Q100
	CPLB	P-VFBGA80	TC9591XBG	MIPI CS12 4 lanex1ch, Parallel input 24 bit@166 MHz → Parallel output@100 MHz, MIPI CS12 4 lanex1ch	AEC-Q100
	D2L-LP	P-VFBGA49	TC9592XBG	MIPI DS12 4 lanex1ch → LVDS Single Link, UXGA 1600x1200 24bit	-
		P-VFBGA64	TC9593XBG	MIPI DS12 4 lanex1ch → LVDS Dual Link, WUXGA 1920x1200 24bit	AEC-Q100
	CPLB	P-VFBGA80	TC9594XBG	Parallel input 24bit@166 MHz → MIPI DS1 4 lanex1ch, WUXGA 1920x1200 24bit	AEC-Q100
	D2DP	P-VFBGA80	TC9595XBG	MIPI DS12 4 lanex1ch, Parallel input 24bit@154 MHz → Display port 1.1a, WUXGA 1920x1200 24bit	AEC-Q100
Video Signal Processing IC	2 pictures processing	P-LBGA256	TC90197XBG	2 pictures processing Quick view for rear camera picture Up/down scaling function Built-in frame memory / Split screen display Picture quality improvement function	-
	Single picture processing	P-FBGA228	TC90193SBG	Single picture processing Quick view for rear camera picture Horizontal aberration correction Picture quality improvement function	-
			TC90193ASBG	Single picture processing Quick view for rear camera picture Horizontal aberration correction Picture quality improvement function	-
Video Decoder IC	Video Decoder	LQFP80	TC90105FG	2 ch Video decoder / Built-in 2ch ADC 2ch Picture quality improvement function Built-in 2.5 V Regulator	-
			LQFP64	TC90107FG	Video decoder Picture quality improvement function Built-in 2.5 V Regulator
		TC90106FG		Video decoder with Component input interface (up to 525p/625p) Built-in 3ch ADC	-
Power Amp IC	Audio Amp	P-HSSOP36	TCB701FNG	49W(max.) BTL x 4ch Audio power IC built-in self diagnostics Toshiba original High efficiency amplifier	AEC-Q100
			TCB702FNG	49W(max.) BTL x 4ch Audio power IC built-in self diagnostics Toshiba original High efficiency amplifier	AEC-Q100

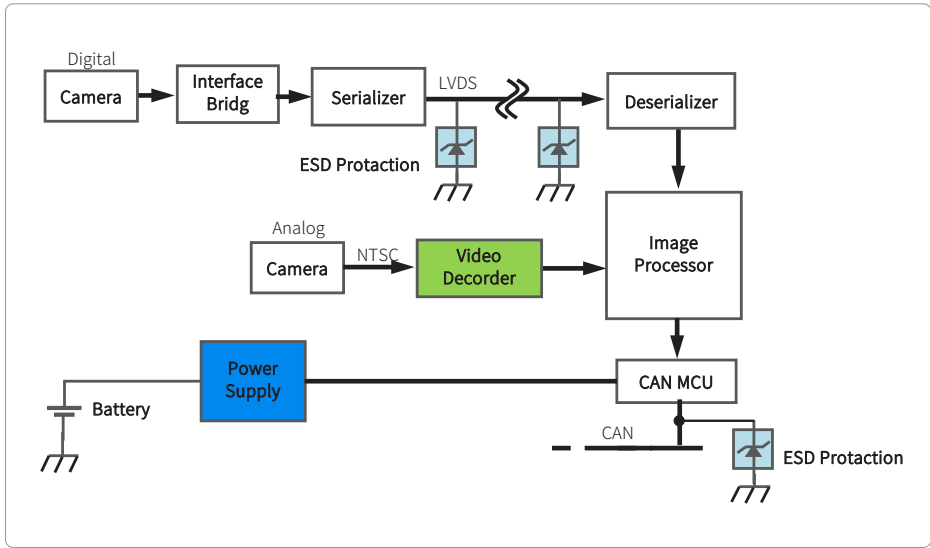
** Under consideration.

Compliant with the reliability requirements of AEC-Q100.

Application 5. Other

5-3. Advanced Driver Assistance System (ADAS)

System Block



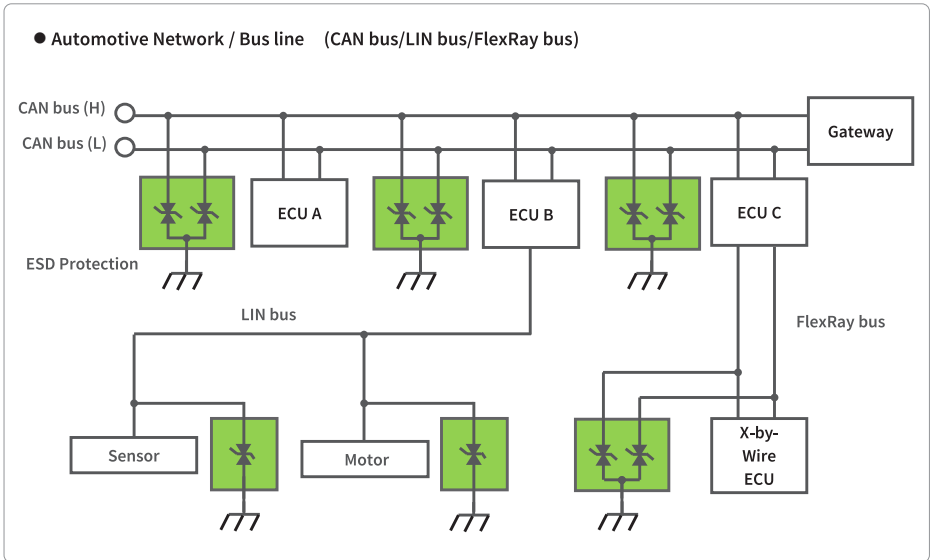
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
CAN LINE ESD protection	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	$V_{RMW}=12\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 30\text{ kV}$, Bidirectional	AEC-Q101
			DF2B29FU	$V_{RMW}=24\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
			DF2B36FU	$V_{RMW}=28\text{ V}$, $C_t=6.5\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	$V_{RMW}=12\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 30\text{ kV}$, Bidirectional	AEC-Q101
			DF3D29FU	$V_{RMW}=24\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
			DF3D36FU	$V_{RMW}=28\text{ V}$, $C_t=6.5\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
LVDS LINE ESD protection		SOD-923 (Single)	DF2S5M4FS	$V_{RMW}=3.6\text{ V}$, $C_t=0.45\text{ pF}$, $V_{ESD}=\pm 20\text{ kV}$, Unidirectional	AEC-Q101
			DF2S6M4FS	$V_{RMW}=5.5\text{ V}$, $C_t=0.45\text{ pF}$, $V_{ESD}=\pm 20\text{ kV}$, Unidirectional	AEC-Q101
Video Decoder IC	Video Decoder	LQFP80	TC90105FG	Video decoder x2, 2.5 V Regulator, Image quality adjustment functions, Image quality improvement functions, ITU-R BT.656 output	
		LQFP64	TC90107FG	Video decoder x1, 2.5 V Regulator, Image quality adjustment functions, Image quality improvement functions, ITU-R BT.656 output	
Power supply	MOSFET	TSON Advance(WF)	TPN7R104NC	N-ch, 40 V / 20 A, 7.1m Ω , T _{ch} =175 °C	AEC-Q101
			XPN9R614MC	P-ch, -40 V / -40 A, 9.6m Ω , T _{ch} =175 °C	AEC-Q101
		SOP Advance(WF)	XPH3R114MC	P-ch, -40 V / -100 A, 3.1m Ω , T _{ch} =175 °C	AEC-Q101

Application 5. Other

5-4. Bus line protection

System Block

































Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
CAN/LIN LINE ESD protection	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	$V_{RMW}=12\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 30\text{ kV}$, Bidirectional	AEC-Q101
			DF2B29FU	$V_{RMW}=24\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
			DF2B36FU	$V_{RMW}=28\text{ V}$, $C_t=6.5\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	$V_{RMW}=12\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 30\text{ kV}$, Bidirectional	AEC-Q101
			DF3D29FU	$V_{RMW}=24\text{ V}$, $C_t=9\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101
			DF3D36FU	$V_{RMW}=28\text{ V}$, $C_t=6.5\text{ pF}$, $V_{ESD}=\pm 25\text{ kV}$, Bidirectional	AEC-Q101

Product Lineups







Diodes

■ Switching Diodes


Package	Part Number	Pin Assignment	Absolute Maximum Ratings				Electrical Characteristics max				AEC-Qxxx qualified
			V_R (V)	I_{FSM} (A)	I_O (A)	T_J (°C)	V_f (V) @ $I_f=0.1$ (A)	I_R (μA)	t_{rr} (ns) @ V_R (V)	t_{rr} (ns)	
ESC (SOD-523) 	1SS387		80	1	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS307E		80	1	0.1	150	1.3	0.01	80	-	AEC-Q101
USC (SOD-323) 	1SS352		80	1	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS403		200	2	0.1	125	1.2	0.1	50	60	AEC-Q101
VESM (SOT-723) 	1SS361FV		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS362FV		80	1	0.1	150	1.2	0.1	30	4	AEC-Q101
SSM (SOT-416) 	1SS360		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS361		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
USM (SOT-323) 	1SS300		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS301		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS302A		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
S-Mini (SOT-346) 	1SS226		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS379		80	2	0.1	125	1.3	0.01	80	-	AEC-Q101
	1SS181		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS184		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS193		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS196		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS190		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS187		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
US6 (SOT-363) 	HN1D01FU		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	HN1D02FU		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	HN1D03FU		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	HN2D01FU		80	2	0.08	125	1.2	0.1	30	4	AEC-Q101
	HN2D02FU		80	2	0.08	125	1.2	0.1	30	4	AEC-Q101

Product Lineups Diodes

■ Rectifier Diodes

Type	Package	Part Number	Absolute Maximum Ratings				Electrical Characteristics max				AEC-Qxxx qualified
			V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	I_{RRM} (μA)	V_{FM} (V)	@ I_{FM} (A)	t_{rr} (ns)	
General Purpose Rectifier Diode	 S-FLAT™	CRG07	400	0.7	15	175	10	1.1	0.7	-	AEC-Q101
		CRG09A	400	1	15	150	5	1.1	0.7	-	AEC-Q101
		CRG09B	400	1	10	150	5	1.1	0.7	-	AEC-Q101
		CRG10A	600	0.7	15	150	5	1.1	0.7	-	AEC-Q101
		CRG04A	600	1	20	150	5	1.1	1	-	AEC-Q101
	 M-FLAT™	CMG06A	600	1	20	150	5	1.1	1	-	AEC-Q101
		CMG03A	600	2	80	150	5	1.1	2	-	AEC-Q101
Supper-Fast Recovery Diode	 S-FLAT™	CRF03A	600	0.7	10	150	50	2	0.7	100	AEC-Q101
	 M-FLAT™	CMF02A	600	1	10	150	50	2	1	100	AEC-Q101
		CMF01A	600	2	30	150	50	2	2	100	AEC-Q101
High-Efficiency Diode	 S-FLAT™	CRH02	200	0.5	10	150	10	0.95	0.5	35	AEC-Q101
		CRH01	200	1	15	-40 to 150	10	0.98	1	35	AEC-Q101
	 M-FLAT™	CMH04	200	1	20	-40 to 150	10	0.98	1	35	AEC-Q101
		CMH07	200	2	40	-40 to 150	10	0.98	2	35	AEC-Q101
		CMH01	200	3	40	-40 to 150	10	0.98	3	35	AEC-Q101








■ Zener Diode














Type	Package	Power Dissipation	Part Number	Zener Voltage V_z (V)	AEC-Qxxx qualified
Zener Diode	 S-FLAT™	0.7 W	CRYxx	6.2,6.8,8.2	AEC-Q101
			CRZxx	10,12,13,15,16,18,20,24,27,30,33,36,39	AEC-Q101

Product Lineups

Diodes

■ TVS Diodes (ESD Protection Diodes)















Package	Part Number	Pin Assignment	Absolute Maximum Ratings			Electrical Characteristics					AEC-Qxxx qualified
			T _J (°C)	V _{ESD} (kV) IEC61000-4-2	V _{ESD} (kV) ISO10605 @330 pF / 2 kΩ	V _Z min (V)	I _R max (μA) @V _R (V)	Z _Z max (Ω)	C _t typ. (pF)		
 VESM (SOT-723)	DF3A5.6FV		150	-	-	5.3	1	2.5	40	65	AEC-Q101
	DF3A6.2FV		150	-	-	5.8	1	3	30	55	AEC-Q101
	DF3A6.8FV		150	-	-	6.4	0.5	5	25	45	AEC-Q101
	DF3A5.6LFV		150	-	-	5.3	1	3.5	3 (typ.)	8	AEC-Q101
	DF3A6.2LFV		150	-	-	5.9	2.5	5	50	6.5	AEC-Q101
	DF3A6.8LFV		150	-	-	6.5	0.5	5	50	6	AEC-Q101

Package	Part Number	Pin Assignment	Absolute Maximum Ratings			Electrical Characteristics					AEC-Qxxx qualified
			T _J (°C)	V _{ESD} (kV) IEC61000-4-2	V _{ESD} (kV) ISO10605 @330 pF / 2 kΩ	V _{RWM} max (V)	I _R max (μA) @V _{RWM} (V)	R _{DM} typ. (Ω)	C _t typ. (pF)		
 ESC (SOD-523)	DF2B6.8E		150	±8	-	5	0.5	5	-	15	AEC-Q101
 USC (SOD-323)	DF2B18FU		150	±30	±30	12	0.1	12	0.8	9	AEC-Q101
	DF2B29FU		150	±25	±30	24	0.1	24	1.1	9	AEC-Q101
	DF2B36FU		150	±20	±20	28	0.1	28	1.5	6.5	AEC-Q101
 USM (SOT-323)	DF3D18FU		150	±30	±30	12	0.1	12	0.8	9	AEC-Q101
	DF3D29FU		150	±25	±30	24	0.1	24	1.1	9	AEC-Q101
	DF3D36FU		150	±20	±20	28	0.1	28	1.5	6.5	AEC-Q101
 SOD-923	DF2S5M4FS		150	±20	-	3.6	0.1	3.6	0.35	0.45	AEC-Q101
	DF2S6M4FS		150	±20	-	5.5	0.1	5.5	0.35	0.45	AEC-Q101

Product Lineups

Diodes



■ Schottky Barrier Diodes (1)

Package	Part Number	Pin Assignment	Absolute Maximum Ratings				Electrical Characteristics max				AEC-Qxxx qualified
			V_{RM} (V)	V_R (V)	I_O (A)	T_J (°C)	V_F (V)	I_R (μA)	I_R (μA)	V_R (V)	
								@ I_F (A)			
ESC (SOD-523) 	CES388		45	40	0.1	125	0.6	0.1	5	40	AEC-Q101
	1SS389		15	10	0.1	125	0.5	0.1	20	10	AEC-Q101
	1SS405		25	20	0.05	125	0.55	0.05	0.5	20	AEC-Q101
	CES520		-	30	0.2	125	0.6	0.2	5	30	AEC-Q101
USC (SOD-323) 	1SS367		15	10	0.1	125	0.5	0.1	20	10	AEC-Q101
	1SS406		25	20	0.05	125	0.55	0.05	0.5	20	AEC-Q101
	CUS520		-	30	0.2	125	0.6	0.2	5	30	AEC-Q101
	CUS521		-	30	0.2	125	0.5	0.2	30	30	AEC-Q101
	CUS357		45	40	0.1	125	0.6	0.1	5	40	AEC-Q101
S-Mini (SOT-346) 	1SS321		12	10	0.05	125	1	0.05	0.5	10	AEC-Q101
	1SS396		45	40	0.1	125	0.6	0.1	5	40	AEC-Q101

Product Lineups

Diodes




■ Schottky Barrier Diodes (2)

Package	Part Number	Absolute Maximum Ratings					Electrical Characteristics max				AEC-Qxxx qualified
		V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	V_{FM} (V)	I_{FM} (A)	
S-FLAT™ 	CRS03	30	1	20	-40 to 150	-40 to 150	100	30	0.45	0.7	AEC-Q101
	CRS04	40	1	20	-55 to 150	-55 to 150	100	40	0.49	0.7	AEC-Q101
	CRS05	30	1	20	-40 to 150	-40 to 150	200	30	0.45	1	AEC-Q101
	CRS09	30	1.5	30	-40 to 150	-40 to 150	50	30	0.46	1.5	AEC-Q101
	CRS12	60	1	20	-40 to 150	-40 to 150	100	60	0.58	1	AEC-Q101
	CRS13	60	1	20	150	-40 to 150	50	60	0.55	1	AEC-Q101
	CRS14	30	2	30	-40 to 150	-40 to 150	50	30	0.49	2	AEC-Q101
	CRS15	30	3	30	-40 to 150	-40 to 150	50	30	0.52	3	AEC-Q101
	CRS10I30A	30	1	20	150	-55 to 150	60	30	0.39	0.7	AEC-Q101
	CRS10I30B	30	1	20	150	-55 to 150	60	30	0.42	1	AEC-Q101
	CRS10I30C	30	1	30	150	-55 to 150	100	30	0.36	1	AEC-Q101
	CRS10I30E	30	1	10	150	-55 to 150	50	30	0.48	1	**
	CRS15I30A	30	1.5	20	150	-55 to 150	60	30	0.46	1.5	AEC-Q101
	CRS15I30B	30	1.5	30	150	-55 to 150	100	30	0.4	1.5	AEC-Q101
	CRS20I30A	30	2	20	150	-55 to 150	60	30	0.49	2	AEC-Q101
	CRS20I30B	30	2	30	150	-55 to 150	100	30	0.45	2	AEC-Q101
	CRS30I30A	30	3	30	150	-55 to 150	100	30	0.49	3	AEC-Q101
	CRS10I40A	40	1	20	150	-55 to 150	60	40	0.49	0.7	AEC-Q101
	CRS10I40B	40	1	25	150	-55 to 150	100	40	0.45	1	AEC-Q101
	CRS04B	40	1	10	150	-55 to 150	50	40	0.49	0.7	**
	CRS10I40E	40	1	10	150	-55 to 150	50	40	0.55	1	**
	CRS15I40A	40	1.5	20	150	-55 to 150	60	40	0.55	1.5	AEC-Q101
	CRS20I40A	40	2	20	150	-55 to 150	60	40	0.6	2	AEC-Q101
CRS20I40B	40	2	25	150	-55 to 150	100	40	0.52	2	AEC-Q101	
CRS10I60E	60	1	10	150	-55 to 150	50	60	0.62	1	**	
M-FLAT™ 	CMS03	30	3	40	-40 to 150	-40 to 150	500	30	0.45	3	AEC-Q101
	CMS05	30	5	70	-40 to 150	-40 to 150	800	30	0.45	5	-
	CMS07	30	2	40	-40 to 150	-40 to 150	500	30	0.45	2	AEC-Q101
	CMS09	30	1	25	-40 to 150	-40 to 150	500	30	0.45	1	AEC-Q101
	CMS10	40	1	25	-40 to 150	-40 to 150	500	40	0.55	1	AEC-Q101
	CMS11	40	2	30	-40 to 150	-40 to 150	500	40	0.55	2	AEC-Q101
	CMS14	60	2	40	-40 to 150	-40 to 150	200	60	0.58	2	AEC-Q101
	CMS15	60	3	60	-40 to 150	-40 to 150	300	60	0.58	3	AEC-Q101
	CMS16	40	3	30	-40 to 150	-40 to 150	200	40	0.55	3	AEC-Q101
	CMS17	30	2	30	-40 to 150	-40 to 150	100	30	0.48	2	AEC-Q101
	CMS10I30A	30	1	30	150	-55 to 150	100	30	0.36	1	AEC-Q101
	CMS20I30A	30	2	30	150	-55 to 150	100	30	0.45	2	AEC-Q101
	CMS30I30A	30	3	30	150	-55 to 150	100	30	0.49	3	AEC-Q101
	CMS10I40A	40	1	25	150	-55 to 150	100	40	0.45	1	AEC-Q101
	CMS15I40A	40	1.5	25	150	-55 to 150	100	40	0.49	1.5	AEC-Q101
	CMS20I40A	40	2	25	150	-55 to 150	100	40	0.52	2	AEC-Q101
CMS30I40A	40	3	25	150	-55 to 150	100	40	0.55	3	AEC-Q101	

** Under consideration

Product Lineups Bipolar Transistors / BRTs

■ Bipolar Transistors

Package	POL.	Part Number	Absolute Maximum Ratings				h _{FE}			V _{CE(sat)} (V)		AEC-Qxxx qualified
			V _{CEO} (V)	I _C (A)	P _C (W)	T _J (°C)	min	max	Test Condition	max	Test Condition	
New PW-Mold 	NPN	2SC3076	50	2	10 (1)	150	70	240	V _{CE} =2V, I _C =0.5A	0.5	I _C =1A, I _B =50 mA	AEC-Q101
		2SC5886A	50	5	20 (1)	150	400	1000	V _{CE} =2V, I _C =0.5A	0.22	I _C =1.6A, I _B =32 mA	AEC-Q101
		TTC016	50	5	24 (1)	175	400	1000	V _{CE} =2V, I _C =0.5A	0.22	I _C =1.6A, I _B =32 mA	AEC-Q101
		2SC6076	80	3	10 (1)	150	180	450	V _{CE} =2V, I _C =0.5A	0.5	I _C =1A, I _B =100 mA	AEC-Q101
		TTC017	80	3	12 (1)	175	180	450	V _{CE} =2V, I _C =0.5A	0.5	I _C =1A, I _B =100 mA	AEC-Q101
		2SC3303	80	5	20 (1)	150	70	240	V _{CE} =1V, I _C =1A	0.4	I _C =3A, I _B =150 mA	AEC-Q101
		TTC008 (5)	285	1.5	1.1	150	100	200	V _{CE} =5V, I _C =0.3A	1	I _C =0.5A, I _B =62.5 mA	AEC-Q101
		2SC6142 (5)	375	1.5	1.1	150	100	200	V _{CE} =5V, I _C =0.1A	0.9	I _C =0.8A, I _B =100 mA	AEC-Q101
		2SC5548A	400	2	15 (1)	150	40	100	V _{CE} =5V, I _C =0.2A	1	I _C =0.8A, I _B =100 mA	AEC-Q101
		2SC6127	800	0.05	10 (1)	150	15	-	V _{CE} =5V, I _C =0.007A	1	I _C =0.02A, I _B =4 mA	AEC-Q101
New PW-Mold2 	PNP	TTC014	800	1	40 (1)	150	100	200	V _{CE} =5V, I _C =0.1A	1	I _C =0.5A, I _B =50 mA	AEC-Q101
		2SD1223	80	4	15 (1)	150	2000	-	V _{CE} =2V, I _C =1A	1.5	I _C =3A, I _B =6 mA	AEC-Q101
		2SA1241	-50	-2	10 (1)	150	70	240	V _{CE} =-2V, I _C =-0.5A	-0.5	I _C =-1A, I _B =-50 mA	AEC-Q101
		2SA1244	-50	-5	20 (1)	150	70	240	V _{CE} =-1V, I _C =-1A	-0.4	I _C =-3A, I _B =-150 mA	AEC-Q101
		2SA2097	-50	-5	20 (1)	150	200	500	V _{CE} =-2V, I _C =-0.5A	-0.27	I _C =-1.6A, I _B =-53 mA	AEC-Q101
		TTA005	-50	-5	24 (1)	175	200	500	V _{CE} =-2V, I _C =-0.5A	-0.27	I _C =-1.6A, I _B =-53 mA	AEC-Q101
		2SB906	-60	-3	20 (1)	150	60	200	V _{CE} =-5V, I _C =-0.5A	-1.7	I _C =-3A, I _B =-300 mA	AEC-Q101
		TTB002	-60	-3	30 (1)	175	100	250	V _{CE} =-5V, I _C =-0.5A	-1.7	I _C =-3A, I _B =-300 mA	AEC-Q101
		TTA003	-80	-3	10 (1)	150	100	200	V _{CE} =-2V, I _C =-0.5A	-0.5	I _C =-1A, I _B =-100 mA	AEC-Q101
		TTA009	-80	-3	12 (1)	175	100	200	V _{CE} =-2V, I _C =-0.5A	-0.5	I _C =-1A, I _B =-100 mA	AEC-Q101
PW-Mini 	NPN	2SA1225	-160	-1.5	15 (1)	150	70	240	V _{CE} =-5V, I _C =-0.1A	-1.5	I _C =-0.5A, I _B =-50 mA	AEC-Q101
		2SA2034	-400	-2	15 (1)	150	80	240	V _{CE} =-5V, I _C =-0.1A	-1	I _C =-0.5A, I _B =-100 mA	AEC-Q101
		2SA2184	-550	-1	20 (1)	150	80	300	V _{CE} =-5V, I _C =-0.1A	-0.7	I _C =-0.3A, I _B =-60 mA	AEC-Q101
		2SA2142	-600	-0.5	15 (1)	150	100	400	V _{CE} =-5V, I _C =-0.05A	-1	I _C =-0.1A, I _B =-10 mA	AEC-Q101
		2SC5819	20	1.5	1.0 (2)	150	400	1000	V _{CE} =2V, I _C =0.15A	0.12	I _C =0.5A, I _B =10 mA	AEC-Q101
		2SC5714	20	4	1.0 (2)	150	400	1000	V _{CE} =2V, I _C =0.5A	0.15	I _C =1.6A, I _B =32 mA	AEC-Q101
		2SC5810	50	1	1.0 (2)	150	400	1000	V _{CE} =2V, I _C =0.1A	0.17	I _C =0.3A, I _B =6 mA	AEC-Q101
		2SC2873	50	2	1.0 (3)	150	70	240	V _{CE} =2V, I _C =0.5A	0.5	I _C =1A, I _B =50 mA	AEC-Q101
		2SC5712	50	3	1.0 (2)	150	400	1000	V _{CE} =2V, I _C =0.3A	0.14	I _C =1A, I _B =20 mA	AEC-Q101
		2SC6126	50	3	1.0 (2)	150	250	400	V _{CE} =2V, I _C =0.3A	0.18	I _C =1A, I _B =33 mA	AEC-Q101
	TTC019	50	5	2.5 (4)	150	400	1000	V _{CE} =2V, I _C =0.5A	0.21	I _C =1.6A, I _B =32 mA	**	
	2SC6124	80	2	1.0 (2)	150	100	200	V _{CE} =2V, I _C =0.5A	0.5	I _C =1A, I _B =100 mA	AEC-Q101	
	TTC020	80	4	2.5 (4)	150	100	200	V _{CE} =2V, I _C =0.4A	0.17	I _C =1.2A, I _B =120 mA	**	
	2SC2881	120	0.8	1.0 (3)	150	80	240	V _{CE} =5V, I _C =0.1A	1	I _C =0.5A, I _B =50 mA	AEC-Q101	
	TTC021	120	3	2.5 (4)	150	120	240	V _{CE} =2V, I _C =0.3A	0.15	I _C =1A, I _B =100 mA	**	
	TTC005	285	1	1.1 (2)	150	100	200	V _{CE} =5V, I _C =0.1A	1	I _C =0.6A, I _B =75 mA	AEC-Q101	
	TTC013	350	0.5	1.0 (2)	150	100	200	V _{CE} =5V, I _C =0.05A	0.3	I _C =0.16A, I _B =20 mA	AEC-Q101	
	TTC018	500	0.1	1.0 (2)	150	100	300	V _{CE} =10V, I _C =0.02A	0.3	I _C =0.02A, I _B =2 mA	AEC-Q101	
	2SD2686	60±10	1	1.0 (2)	150	2000	-	V _{CE} =2V, I _C =1A	1.5	I _C =1A, I _B =1 mA	AEC-Q101	
	NPN	2SA2069	-20	-1.5	1.0 (2)	150	200	500	V _{CE} =-2V, I _C =-0.15A	-0.14	I _C =-0.5A, I _B =-17 mA	AEC-Q101
2SA2059		-20	-3	1.0 (2)	150	200	500	V _{CE} =-2V, I _C =-0.5A	-0.19	I _C =-1.6A, I _B =-53 mA	AEC-Q101	
2SA2070		-50	-1	1.0 (2)	150	200	500	V _{CE} =-2V, I _C =-0.1A	-0.2	I _C =-0.3A, I _B =-10 mA	AEC-Q101	
2SA1213		-50	-2	1.0 (3)	150	70	240	V _{CE} =-2V, I _C =-0.5A	-0.5	I _C =-1A, I _B =-50 mA	AEC-Q101	
2SA2060		-50	-2	1.0 (2)	150	200	500	V _{CE} =-2V, I _C =-0.3A	-0.2	I _C =-1A, I _B =-33 mA	AEC-Q101	
TTA011		-50	-5	2.5 (4)	150	200	500	V _{CE} =-2V, I _C =-0.5A	-0.27	I _C =-1.6A, I _B =-53 mA	**	
2SA2206		-80	-2	1.0 (2)	150	100	200	V _{CE} =-2V, I _C =-0.5A	-0.5	I _C =-1A, I _B =-100 mA	AEC-Q101	
TTA012		-80	-4	2.5 (4)	150	100	200	V _{CE} =-2V, I _C =-0.4A	-0.22	I _C =-1.2A, I _B =-120 mA	**	
2SA1201		-120	-0.8	1.0 (3)	150	80	240	V _{CE} =-5V, I _C =-0.1A	-1	I _C =-0.5A, I _B =-50 mA	AEC-Q101	
TTA013		-120	-2.5	2.5 (4)	150	120	240	V _{CE} =-2V, I _C =-0.25A	-0.32	I _C =-0.75A, I _B =-75 mA	**	
2SA1971	-400	-0.5	1.0 (3)	150	140	400	V _{CE} =-5V, I _C =-0.1A	-1	I _C =-0.1A, I _B =-10 mA	AEC-Q101		
TTA010	-500	-0.1	1.0 (2)	150	100	300	V _{CE} =-10V, I _C =-0.02A	-0.3	I _C =-0.02A, I _B =-2 mA	AEC-Q101		

(1) T_c=25 °C

(2) Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)

(3) Mounted on a ceramic substrate 250 mm² × 0.8 t

(4) Mounted on a ceramic board (0.8 mm thick, Cu area: 1600 mm²)








(5) New PW-Mold2

** Under consideration

Product Lineups

Bipolar Transistors / BRTs

■ Bipolar Transistors









Package	POL.	Part Number	Absolute Maximum Ratings				h _{FE}			V _{CE(sat)} (V)		AEC-Qxxx qualified		
			V _{CEO} (V)	I _C (A)	P _C (W)	T _J (°C)	min	max	Test Condition	max	Test Condition			
 VESM	NPN	2SC6026MFV	50	0.15	0.15 (1)	150	120	400	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
	PNP	2SA2154MFV	-50	-0.15	0.15 (1)	150	120	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
 SSM	NPN	2SC4738	50	0.15	0.1	125	120	700	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
	PNP	2SA1832	-50	-0.15	0.1	125	70	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
 USM	NPN	2SC4116	50	0.15	0.1	125	70	700	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
		2SC4117	120	0.1	0.1	125	200	700	V _{CE} =6 V, I _C =2 mA	0.3	I _C =0.01 A, I _B =1 mA	AEC-Q101		
	PNP	2SA1588	-30	-0.5	0.1	125	70	400	V _{CE} =-1 V, I _C =-100 mA	-0.25	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
		2SA1586	-50	-0.15	0.1	125	70	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
		2SA1587	-120	-0.1	0.1	125	200	700	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.01 A, I _B =-1 mA	AEC-Q101		
 US6	NPN	HN1C03FU	20	0.3	0.2	150	200	1200	V _{CE} =2 V, I _C =4 mA	0.1	I _C =0.03 A, I _B =3 mA	AEC-Q101		
		HN1C01FU	50	0.15	0.2	125	120	400	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
	Complementary	PNP	HN1A01FU	-50	-0.15	0.2	125	120	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101	
				50	0.15				400	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA		
		NPN	HN1B04FU	-50	-0.15	0.2	125	120	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101	
				50	0.15				400	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101	
 S-Mini	NPN	2SC3326	20	0.3	0.15	125	200	1200	V _{CE} =2 V, I _C =4 mA	0.1	I _C =0.03 A, I _B =3 mA	AEC-Q101		
		2SC3265	25	0.8	0.2	150	100	320	V _{CE} =1 V, I _C =100 mA	0.4	I _C =0.5 A, I _B =20 mA	AEC-Q101		
		2SC2712	50	0.15	0.15	125	70	700	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
		2SC3325	50	0.5	0.2	150	70	240	V _{CE} =1 V, I _C =100 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
		2SC2713	120	0.1	0.15	125	200	700	V _{CE} =6 V, I _C =2 mA	0.3	I _C =0.01 A, I _B =1 mA	AEC-Q101		
	PNP	2SA1362	-15	-0.8	0.2	150	120	400	V _{CE} =-1 V, I _C =-100 mA	-0.2	I _C =-0.4 A, I _B =-8 mA	AEC-Q101		
		2SA1298	-25	-0.8	0.2	150	100	320	V _{CE} =-1 V, I _C =-100 mA	-0.4	I _C =-0.5 A, I _B =-20 mA	AEC-Q101		
		2SA1182	-30	-0.5	0.15	125	70	400	V _{CE} =-1 V, I _C =-100 mA	-0.25	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
		2SA1162	-50	-0.15	0.15	125	70	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
		2SA1313	-50	-0.5	0.2	150	70	240	V _{CE} =-1 V, I _C =-100 mA	-0.25	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
		2SA1163	-120	-0.1	0.15	125	200	700	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.01 A, I _B =-1 mA	AEC-Q101		
		SOT-23F	NPN	TTC500	50	1	1 (1)	150	400	1000	V _{CE} =2 V, I _C =0.1 A	0.12	I _C =0.3 A, I _B =6 mA	AEC-Q101
				TTC501	80	2.5	1 (1)	150	400	1000	V _{CE} =2 V, I _C =0.3 A	0.14	I _C =1 A, I _B =20 mA	AEC-Q101
				TTC502	120	1	1 (1)	150	120	300	V _{CE} =2 V, I _C =0.1 A	0.14	I _C =0.3 A, I _B =10 mA	AEC-Q101
PNP	TTA500		-50	-1	1 (1)	150	200	500	V _{CE} =-2 V, I _C =-0.1 A	-0.2	I _C =-0.3 A, I _B =-10 mA	AEC-Q101		
	TTA501	-50	-2	1 (1)	150	200	500	V _{CE} =-2 V, I _C =-0.3 A	-0.2	I _C =-1 A, I _B =-33 mA	AEC-Q101			
	TTA502	-20	-2.5	1 (1)	150	200	500	V _{CE} =-2 V, I _C =-0.5 A	-0.19	I _C =-1.6 A, I _B =-53 mA	AEC-Q101			
 UFM	NPN	2SC6100	50	2.5	0.8/0.5 (2)	150	400	1000	V _{CE} =2 V, I _C =300 mA	0.14	I _C =1 A, I _B =20 mA	AEC-Q101		
		2SC6135	50	1.0	0.8/0.5 (2)	150	400	1000	V _{CE} =2 V, I _C =100 mA	0.12	I _C =0.3 A, I _B =6 mA	AEC-Q101		
	PNP	2SA2215	-20	-2.5	0.8/0.5 (2)	150	200	500	V _{CE} =-2 V, I _C =-500 mA	-0.19	I _C =-1.6 A, I _B =-53 mA	AEC-Q101		
		2SA2195	-50	-1.7	0.8/0.5 (2)	150	200	500	V _{CE} =-2 V, I _C =-300 mA	-0.2	I _C =-1.0 A, I _B =-33 mA	AEC-Q101		
 ES6	NPN Dual	HN1C01FE	50	0.15	0.1	150	120	400	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA	AEC-Q101		
	PNP Dual	HN1A01FE	-50	-0.15	0.1	150	120	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		
	Complementary	HN1B04FE	50	0.15				400	V _{CE} =6 V, I _C =2 mA	0.25	I _C =0.1 A, I _B =10 mA			
			-50	-0.15	0.1	150	120	400	V _{CE} =-6 V, I _C =-2 mA	-0.3	I _C =-0.1 A, I _B =-10 mA	AEC-Q101		

(1) FR4 board
(2) Ceramic board / FR4 board

Product Lineups

Bipolar Transistors / BRTs

■ BRTs

V _{ce0} (V)	I _c (mA)	Resistance		VESM (SOT-723)		SSM (SOT-416)		USM (SOT-323)		S-Mini (SOT-346)	
											
		R1 typ. (kΩ)	R2 typ. (kΩ)	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
Part Number											
50	100	4.7	4.7	RN1101MFV #	RN2101MFV #	RN1101 #	RN2101 #	RN1301 #	RN2301 #	RN1401 #	RN2401 #
		10	10	RN1102MFV #	RN2102MFV #	RN1102 #	RN2102 #	RN1302 #	RN2302 #	RN1402 #	RN2402 #
		22	22	RN1103MFV #	RN2103MFV #	RN1103 #	RN2103 #	RN1303 #	RN2303 #	RN1403 #	RN2403 #
		47	47	RN1104MFV #	RN2104MFV #	RN1104 #	RN2104 #	RN1304 #	RN2304 #	RN1404 #	RN2404 #
		2.2	47	RN1105MFV #	RN2105MFV #	RN1105 #	RN2105 #	RN1305 #	RN2305 #	RN1405 #	RN2405 #
		4.7	47	RN1106MFV #	RN2106MFV #	RN1106 #	RN2106 #	RN1306 #	RN2306 #	RN1406 #	RN2406 #
		10	47	RN1107MFV #	RN2107MFV #	RN1107 #	RN2107 #	RN1307 #	RN2307 #	RN1407 #	RN2407 #
		22	47	RN1108MFV #	RN2108MFV #	RN1108 #	RN2108 #	RN1308 #	RN2308 #	RN1408 #	RN2408 #
		47	22	RN1109MFV #	RN2109MFV #	RN1109 #	RN2109 #	RN1309 #	RN2309 #	RN1409 #	RN2409 #
		4.7	∞	RN1110MFV #	RN2110MFV #	RN1110 #	RN2110 #	RN1310 #	RN2310 #	RN1410 #	RN2410 #
		10	∞	RN1111MFV #	RN2111MFV #	RN1111 #	RN2111 #	RN1311 #	RN2311 #	RN1411 #	RN2411 #
		22	∞	RN1112MFV #	RN2112MFV #	RN1112 #	RN2112 #	RN1312 #	-	RN1412 #	RN2412 #
		47	∞	RN1113MFV #	RN2113MFV #	RN1113 #	RN2113 #	RN1313 #	-	RN1413 #	RN2413 #
		1	10	RN1114MFV #	RN2114MFV #	RN1114 #	-	RN1314 #	-	RN1414 #	RN2414 #
		2.2	10	RN1115MFV #	RN2115MFV #	RN1115 #	RN2115 #	RN1315 #	-	RN1415 #	RN2415 #
		4.7	10	RN1116MFV #	RN2116MFV #	RN1116 #	RN2116 #	RN1316 #	RN2316 #	RN1416 #	RN2416 #
		10	4.7	RN1117MFV #	RN2117MFV #	-	-	-	-	RN1417 #	RN2417 #
		47	10	RN1118MFV #	-	-	-	-	-	RN1418 #	RN2418 #
		1	∞	RN1119MFV #	RN2119MFV #	-	-	-	-	-	-
		100	100	RN1130MFV #	RN2130MFV #	-	-	-	-	-	-
100	∞	RN1131MFV #	RN2131MFV #	-	-	-	-	-	-		
200	∞	RN1132MFV #	RN2132MFV #	-	-	-	-	-	-		

AEC-Q101 qualified

Product Lineups

Bipolar Transistors / BRTs

■ BRTs

V _{ce0} (V)	I _c (mA)	ES6 (SOT-563)				US6 (SOT-363)					
		Resistance				Resistance					
		R1 typ. (kΩ)	R2 typ. (kΩ)	Point symmetrical		Point symmetrical		Point symmetrical			
		NPNx2	PNPx2	PNP+NPN	NPN+PNP	NPNx2	PNPx2	PNP+NPN	NPN+PNP		
Part Number											
50	100	4.7	4.7	RN1901FE #	RN2901FE #	RN4901FE #	RN4981FE #	RN1901 #	RN2901 #	RN4901 #	RN4981 #
		10	10	RN1902FE #	RN2902FE #	RN4902FE #	RN4982FE #	RN1902 #	RN2902 #	RN4902 #	RN4982 #
		22	22	RN1903FE #	RN2903FE #	RN4903FE #	RN4983FE #	RN1903 #	RN2903 #	RN4903 #	RN4983 #
		47	47	RN1904FE #	RN2904FE #	RN4904FE #	RN4984FE #	RN1904 #	RN2904 #	RN4904 #	RN4984 #
		2.2	47	RN1905FE #	RN2905FE #	RN4905FE #	RN4985FE #	RN1905 #	RN2905 #	RN4905 #	RN4985 #
		4.7	47	RN1906FE #	RN2906FE #	RN4906FE #	RN4986FE #	RN1906 #	RN2906 #	RN4906 #	RN4986 #
		10	47	RN1907FE #	RN2907FE #	RN4907FE #	RN4987FE #	RN1907 #	RN2907 #	RN4907 #	RN4987 #
		22	47	RN1908FE #	RN2908FE #	RN4908FE #	RN4988FE #	RN1908 #	RN2908 #	RN4908 #	RN4988 #
		47	22	RN1909FE #	RN2909FE #	RN4909FE #	RN4989FE #	RN1909 #	RN2909 #	RN4909 #	RN4989 #
		4.7	∞	RN1910FE #	RN2910FE #	RN4910FE #	RN4990FE #	RN1910 #	RN2910 #	RN4910 #	RN4990 #
10	∞	RN1911FE #	RN2911FE #	RN4911FE #	RN4991FE #	RN1911 #	RN2911 #	RN4911 #	-		

V _{ce0} (V)	I _c (mA)	USV (SOT-353)			
		Resistance			
		R1 typ. (kΩ)	R2 typ. (kΩ)		
		NPNx2	PNPx2		
Part Number					
50	100	4.7	4.7	RN1701 #	RN2701 #
		10	10	RN1702 #	RN2702 #
		22	22	RN1703 #	RN2703 #
		47	47	RN1704 #	RN2704 #
		2.2	47	RN1705 #	RN2705 #
		4.7	47	RN1706 #	RN2706 #
		10	47	RN1707 #	RN2707 #
		22	47	RN1708 #	RN2708 #
		47	22	RN1709 #	RN2709 #
		4.7	∞	RN1710 #	RN2710 #
10	∞	RN1711 #	RN2711 #		
1	10	-	RN2714 #		

#AEC-Q101 qualified

Product Lineups MOSFETS

Diodes

Bipolar Transistors/BJTs

MOSFETS

Standard Logic Devices

Photocouplers/Photoarrays

ICs

Packages

■ DPAK+ Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)		C _{iss} typ. (pF)	Q _g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	I _D (A)	P _D (W)	V _{GS} =6V	V _{GS} =10V				
N-ch	TK15S04N1L	40	15	46	37 (@4.5 V)	17.8	610	10	175	AEC-Q101
	TK35S04K3L	40	35	58	15	10.3	1370	28	175	AEC-Q101
	TK65S04N1L	40	65	107	7.8 (@4.5 V)	4.3	2550	39	175	AEC-Q101
	TK100S04N1L	40	100	180	4.5 (@4.5 V)	2.3	5490	76	175	AEC-Q101
	TK1R4S04PB	40	120	180	1.9	1.35	5500	103	175	AEC-Q101
	TK8S06K3L	60	8	25	80	54	400	10	175	AEC-Q101
	TK25S06N1L	60	25	57	36.8 (@4.5 V)	18.5	855	15	175	AEC-Q101
	TK40S06N1L	60	40	88.2	18 (@4.5 V)	10.5	1650	26	175	AEC-Q101
	TK60S06K3L	60	60	88	12.3	8	2900	60	175	AEC-Q101
	TK90S06N1L	60	90	157	5.2 (@4.5 V)	3.3	5400	81	175	AEC-Q101
	TK7S10N1Z	100	7	50	-	48	470	7.1	175	AEC-Q101
	TK11S10N1L	100	11	65	50 (@4.5 V)	28	850	15	175	AEC-Q101
	TK33S10N1Z	100	33	125	-	9.7	2050	28	175	AEC-Q101
	TK33S10N1L	100	33	125	16.2 (@4.5 V)	9.7	2250	33	175	AEC-Q101
	TK55S10N1	100	55	157	-	6.5	3280	49	175	AEC-Q101
TK60S10N1L	100	60	180	9.25	6.11	4320	60	175	AEC-Q101	
P-ch	TJ10S04M3L	-40	-10	27	62	44	930	19	175	AEC-Q101
	TJ20S04M3L	-40	-20	41	32	22.2	1850	37	175	AEC-Q101
	TJ40S04M3L	-40	-40	68	13	9.1	4140	83	175	AEC-Q101
	TJ60S04M3L	-40	-60	90	9.4	6.3	6510	125	175	AEC-Q101
	TJ80S04M3L	-40	-80	100	7.9	5.2	7770	158	175	AEC-Q101
	TJ90S04M3L	-40	-90	180	6.0 (@4.5 V)	4.3	7700	172	175	AEC-Q101
	TJ8S06M3L	-60	-8	27	130	104	890	19	175	AEC-Q101
	TJ15S06M3L	-60	-15	41	63	50	1770	36	175	AEC-Q101
	TJ30S06M3L	-60	-30	68	28	21.8	3950	80	175	AEC-Q101
	TJ50S06M3L	-60	-50	90	17.4	13.8	6290	124	175	AEC-Q101
	TJ60S06M3L	-60	-60	100	14.5	11.2	7760	156	175	AEC-Q101
	TJ15S10M3	-100	-15	75	-	130	3200	69	175	-

■ L-TOGL™ Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)		C _{iss} typ. (pF)	Q _g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	I _D (A)	P _D (W)	V _{GS} =6V	V _{GS} =10V				
N-ch	XPQR3004PB*	40	(400)	TBD	(0.47)	(0.3)	(27000)	TBD	TBD	**
	S1RP1*	40	(300)	TBD	TBD	(0.56)	TBD	TBD	TBD	**
	XPQ1R004PB*	40	(200)	TBD	(1.8)	(1.0)	(5300)	TBD	TBD	**
	XPQR8308QB*	80	(350)	TBD	(1.23)	(0.83)	(19000)	TBD	TBD	**
	S1TC6*	80	(230)	TBD	TBD	(1.5)	TBD	TBD	TBD	**
	S1TC5*	80	(130)	TBD	(4.9)	(3.3)	(4700)	TBD	TBD	**
	XPQ1R00AQB*	100	(300)	TBD	(1.93)	(1.03)	(16500)	TBD	TBD	**
	S1RP4*	100	(200)	TBD	TBD	(2.5)	TBD	TBD	TBD	**
	S1RP5*	100	(100)	TBD	(8.0)	(4.1)	(4300)	TBD	TBD	**

■ S-TOGL™ Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)		C _{iss} typ. (pF)	Q _g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	I _D (A)	P _D (W)	V _{GS} =6V	V _{GS} =10V				
N-ch	S1RP2*	40	(200)	TBD	TBD	(0.66)	TBD	TBD	TBD	**
	S1RP3*	40	(130)	TBD	TBD	(1.0)	TBD	TBD	TBD	**
	S1SF8*	40	(100)	TBD	TBD	(1.4)	TBD	TBD	TBD	**
	S1TZ5*	80	(200)	TBD	TBD	(1.94)	TBD	TBD	TBD	**
	S1TZ4*	80	(180)	TBD	TBD	(3.5)	TBD	TBD	TBD	**
	S1TZ3*	80	(150)	TBD	TBD	(5.4)	TBD	TBD	TBD	**
	S1SC6*	100	(200)	TBD	TBD	(2.6)	TBD	TBD	TBD	**
	S1SC7*	100	(150)	TBD	TBD	(4.7)	TBD	TBD	TBD	**
	S1SJ8*	100	(100)	TBD	TBD	(7.3)	TBD	TBD	TBD	**

* Under development (The specification is subject to change without notice), ** Under Consideration

Product Lineups MOSFETs

■ SOP Advance (WF) Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)		C _{ISS} typ. (pF)	Q _g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	I _D (A)	P _D (W)	V _{GS} =6 V	V _{GS} =10 V				
N-ch	XPH3R304PS	40	60	76	6.3	3.3	1660	30	175	AEC-Q101
	XPH2R404PS	40	90	93	4.1	2.4	2500	40	175	AEC-Q101
	XPH1R104PS	40	120	132	1.96	1.14	4560	55	175	AEC-Q101
	XPHR9904PS*	40	(130)	TBD	(1.42)	(0.99)	(5520)	TBD	TBD	**
	XPHR7904PS	40	150	170	1.3	0.79	6650	85	175	AEC-Q101
	XPH3R206NC	60	70	132	6.2 (@4.5V)	3.2	4180	65	175	AEC-Q101
	XPH2R106NC	60	110	170	4.1 (@4.5V)	2.1	6900	104	175	AEC-Q101
	XPH3R908QB*	80	(80)	TBD	(5.6)	(3.9)	(3750)	TBD	TBD	**
	XPH2R408QB*	80	(120)	TBD	(3.5)	(2.4)	(5800)	TBD	TBD	**
	XPH6R30ANB	100	45	132	9.5	6.3	3240	52	175	AEC-Q101
P-ch	XPH4R10ANB	100	70	170	6.2	4.1	4970	75	175	AEC-Q101
	XPH4R714MC	-40	-60	132	6.9 (@4.5 V)	4.7	5640	160	175	AEC-Q101
	XPH3R114MC	-40	-100	170	4.7 (@4.5 V)	3.1	9500	230	175	AEC-Q101
	S1NL9*	-60	(-55)	TBD	TBD (@4.5 V)	(1.3)	(6200)	TBD	TBD	**
	S1NL8*	-60	(-90)	TBD	(10.2 (@4.5V))	(8.3)	(9500)	TBD	TBD	**

■ DSOP Advance (WF) Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)		C _{ISS} typ. (pF)	Q _g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	I _D (A)	P _D (W)	V _{GS} =6 V	V _{GS} =10 V				
N-ch	TPW1R104PB	40	120	132	1.96	1.14	4560	55	175	AEC-Q101
	TPWR7904PB	40	150	170	1.3	0.79	6650	85	175	AEC-Q101
	XPW3R908QB*	80	(80)	TBD	(5.6)	(3.9)	(3750)	TBD	TBD	**
	XPW2R408QB*	80	(120)	TBD	(3.5)	(2.4)	(5800)	TBD	TBD	**
	XPW6R30ANB	100	45	132	9.5	6.3	3240	52	175	AEC-Q101
	XPW4R10ANB	100	70	170	6.2	4.1	4970	75	175	AEC-Q101

■ TSON Advance (WF) Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)		C _{ISS} typ. (pF)	Q _g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	I _D (A)	P _D (W)	V _{GS} =6 V	V _{GS} =10 V				
N-ch	XPN7R104NC	40	20	65	14.2 (@4.5 V)	7.1	1290	21	175	AEC-Q101
	XPN3R804NC	40	40	100	7.8 (@4.5 V)	3.8	2230	35	175	AEC-Q101
	XPN12006NC	60	20	65	23.7 (@4.5 V)	12	1100	23	175	AEC-Q101
	XPN6R706NC	60	40	100	13.3 (@4.5 V)	6.7	2000	35	175	AEC-Q101
	XPN1300ANC	100	30	100	24.2 (@4.5V)	13.3	1470	28	175	AEC-Q101
P-ch	XPN19014MC*	-40	(-20)	TBD	(27.3 (@4.5 V))	(18.7)	(1600)	TBD	TBD	**
	XPN9R614MC	-40	-40	100	13.4 (@4.5 V)	9.6	3000	64	175	AEC-Q101
	S1NM1*	-60	(-15)	TBD	TBD (@4.5 V)	(45.5)	(1950)	TBD	TBD	**
S1NM0*	-60	(-25)	TBD	TBD (@4.5 V)	(27.3)	(3150)	TBD	TBD	**	

* Under development (The specification is subject to change without notice.), ** Under Consideration

Product Lineups MOSFETS

Diodes
Bipolar Transistors/BRTs
MOSFETS
Standard Logic Devices
Photocouplers/Photoarrays
ICs
Packages

■ SOT-23F Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM3K336R	30	±20	3	-	-	140	95	1.7	126	150	AEC-Q101
	SSM3K335R	30	±20	6	-	-	56	38	2.7	340	150	AEC-Q101
	SSM3K333R	30	±20	6	-	-	42	28	3.4	436	150	AEC-Q101
	SSM3K376R	30	12/-8	4	109 (@1.8V)	72	56	-	2.2	200	150	AEC-Q101
	SSM3K347R †	38	±20	2	-	-	410	340	2.5	86	150	AEC-Q101
	SSM3K337R †	38	±20	2	-	-	176	150	3	120	150	AEC-Q101
	SSM3K357R	60	±12	0.65	-	2400 (@3V)	-	1800 (@5V)	1.5	43	150	AEC-Q101
	SSM3K2615R	60	±20	2	-	580 (@3.3V)	440 (@4V)	300	6	150	150	AEC-Q101
	SSM3K318R	60	±20	2.5	-	-	145	107	7	235	150	AEC-Q101
	SSM3K341R	60	±20	6	-	-	51	36	9.3	550	175	AEC-Q101
	SSM3K361R	100	±20	3.5	-	-	92	69	3.2	430	175	AEC-Q101
	P-ch	SSM3J377R	-20	-8/+6	-3.9	240	123	93	-	-	290	150
SSM3J371R		-20	-8/+6	-4	150	75	55	-	10.4	630	150	AEC-Q101
SSM3J378R		-20	-8/+6	-6	88.4	39.7	29.8	-	12.8	840	150	AEC-Q101
SSM3J374R		-30	-20/+10	-4	-	-	105	71	5.9	280	150	AEC-Q101
SSM3J372R		-30	-12/+6	-6	144 (@1.8V)	72	50	42	8.2	560	150	AEC-Q101
SSM3J356R		-60	-20/+10	-2	-	-	360	300	8.3	330	150	AEC-Q101
SSM3J351R		-60	-20/+10	-3.5	-	-	164	134	15.1	660	150	AEC-Q101

■ TSOP6F Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM6K818R	30	±20	15	-	-	12	8.9	7.5	1130	150	AEC-Q101
	SSM6K804R	40	±20	12	-	-	18	12	7.5	1110	175	AEC-Q101
	SSM6K809R	60	±20	6	-	-	51	36	9.3	550	175	AEC-Q101
	SSM6K810R	100	±20	3.5	-	-	92	69	3.2	430	175	AEC-Q101
	SSM6K819R	100	±20	10	-	-	36.4	25.8	3.1	840	175	AEC-Q101
P-ch	SSM6J808R	-40	-20/+10	-7	-	-	48	35	24.2	1020	150	AEC-Q101
	SSM6J811R*	-60	-20/+10	-4	-	-	164	134	15.1	660	150	**
N-ch x2	SSM6N357R	60	±12	0.65	-	2400 (@3.0V)	-	1800 (@5V)	1.5	43	150	AEC-Q101
N-ch+ P-ch	SSM6N813R	100	±20	3.5	-	-	154	112	3.6	242	175	AEC-Q101
	SSM6L820R	30	+12/-8	4	82 (@1.8V)	53	39.1	-	2.5	280	150	AEC-Q101
		-20	-12/+6	-4	157 (@1.8V)	76	56	45	6.7	480	150	AEC-Q101

■ S-Mini Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM3K15F	30	±20	0.1	-	7000	-	-	-	7.8	150	AEC-Q101
	SSM3K7002KF	60	±20	0.4	-	-	1750	1500	0.39	26	150	AEC-Q101
P-ch	SSM3J15F	-30	±20	-0.1	-	32000	-	-	-	9.1	150	AEC-Q101
	SSM3J168F	-60	±20	-0.4	-	-	1900	1550	-	9.1	150	AEC-Q101
	SSM3J375F	-20	-8/+6	-2	311	179	150	-	4.6	270	150	AEC-Q101

■ UDFN6 / UDFN6B Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM6K504NU %	30	±20	9	-	-	26	19.5	4.8	620	150	AEC-Q101
N-chx2	SSM6N61NU	20	±8	4	108	45	33	-	3.6	410	150	AEC-Q101
	SSM6N67NU	30	12/-8	4	82 (@1.8V)	53	39.1	-	3.2	310	150	AEC-Q101
	SSM6N68NU	30	12/-8	4	180 (@1.8V)	117	84	-	1.8	129	150	AEC-Q101
	SSM6P69NU	-20	-12/+6	-4	157 (@1.8V)	76	56	45	6.74	480	150	AEC-Q101

■ DFN2020(WF) Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-chx2	XSM6N65NW*	30	20/-12	4	-	-	64	46	2.5	280	150	AEC-Q101
	XSM6N67NW*	30	12/-8	4	-	53	39.1	-	3.2	310	150	AEC-Q101

* Under development (The specification is subject to change without notice), ** Under Consideration

† With Active clamp
% UDFN6B Package

Product Lineups MOSFETs

■ UF6 Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM6K403TU	20	±10	4.2	66	32	28 (@4V)	-	16.8	1050	150	AEC-Q101
	SSM6K404TU	20	±10	3	147	70	55 (@4V)	-	5.9	400	150	AEC-Q101
	SSM6K406TU	30	±20	4.4	-	-	38.5	25	12.4	490	150	AEC-Q101
	SSM6K407TU	60	±20	2	-	-	440 (@4V)	300	6	150	150	AEC-Q101
P-ch	SSM6J424TU	-20	-8/+6	-6	54	26	22.5	-	23.1	1650	150	AEC-Q101
	SSM6J422TU	-20	-8/+6	-4	99.6	51.4	42.7	-	12.8	840	150	AEC-Q101
	SSM6J402TU	-30	±20	-2	-	-	275 (@4V)	117	5.3	280	150	AEC-Q101
	SSM6J410TU	-30	±20	-2.1	-	-	393 (@4V)	216	2.9	120	150	AEC-Q101
N-chx2	SSM6J401TU	-30	±20	-2.5	-	-	145 (@4V)	73	16	730	150	AEC-Q101
	SSM6N36TU	20	±10	0.5	1520	850	660	-	1.23	46	150	AEC-Q101
	SSM6N62TU	20	±8	0.8	173 456 (@1.2V)	98	85	-	2	177	150	AEC-Q101
	SSM6N39TU	20	±10	1.6	247	139	119 (@4V)	-	7.5	260	150	AEC-Q101
P-chx2	SSM6N24TU	30	±12	0.5	-	180	145	-	-	245	150	AEC-Q101
	SSM6N40TU	30	±20	1.6	-	-	182 (@4V)	112	5.1	180	150	AEC-Q101
	SSM6P36TU	-20	±8	-0.33	3600	1600 (@-2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM6P39TU	-20	±8	-1.5	-	294	213 (@4V)	-	6.4	250	150	AEC-Q101
N-ch+ P-ch	SSM6P40TU	-30	±20	-1.4	-	-	403 (@4V)	226	2.9	120	150	AEC-Q101
	SSM6L36TU	20	±10	0.5	1520	850	660	-	1.23	46	150	AEC-Q101
	SSM6L39TU	20	±10	1.6	247	139	119 (@4V)	-	7.5	260	150	AEC-Q101
	SSM6L39TU	-20	±8	-1.5	-	294	213 (@4V)	-	6.4	250	150	AEC-Q101
	SSM6L12TU	30	±12	0.5	-	180	145	-	-	245	150	AEC-Q101
	SSM6L12TU	-20	±12	-0.4	-	430	260 (@4V)	-	-	218	150	AEC-Q101
	SSM6L40TU	30	±20	1.6	-	-	182 (@4V)	112	5.1	180	150	AEC-Q101
	SSM6L40TU	-30	±20	-1.4	-	-	403 (@4V)	226	2.9	120	150	AEC-Q101

■ UFM Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM3K36TU	20	±10	0.5	1520	850	660	630 (@5V)	1.23	46	150	AEC-Q101
	SSM3K62TU	20	±8	0.8	139 432 (@1.2V)	69	57	-	2	177	150	AEC-Q101
	SSM3K122TU	20	±10	2	304	161	-	-	3.4	195	150	AEC-Q101
	SSM3K121TU	20	±10	3.2	140	63	-	-	5.9	400	150	AEC-Q101
	SSM3K123TU	20	±10	4.2	66	32	-	-	13.6	1010	150	AEC-Q101
	SSM3K127TU	30	±12	2	-	167	-	-	1.5	123	150	AEC-Q101
	SSM3K116TU	30	±12	2.2	-	135	100	-	-	245	150	AEC-Q101
	SSM3K131TU	30	±20	6	-	-	41.5	28	10.1	450	150	AEC-Q101
	SSM3H137TU †	34	±20	2	-	-	280	240	3	119	150	AEC-Q101
	SSM3K2615TU	60	±20	2	-	580 (@3.3V)	-	300	6	150	150	AEC-Q101
	SSM3K341TU	60	±20	6	-	-	51	36	9.3	550	175	AEC-Q101
	SSM3K361TU	100	±20	3.5	-	-	92	69	3.2	430	175	AEC-Q101
	SSM3J36TU	-20	±8	-0.33	3600	1600 (@-2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM3J145TU	-20	-8/+6	-3	260	132	103	-	4.6	270	150	AEC-Q101
P-ch	SSM3J144TU	-20	-8/+6	-3.2	240	123	93	-	4.7	290	150	AEC-Q101
	SSM3J140TU	-20	-8/+6	-4.4	63.2	31	25.8	-	24.8	1800	150	AEC-Q101
	SSM3J143TU	-20	-8/+6	-5.5	88.4	39.7	29.8	-	12.8	840	150	AEC-Q101
	SSM3J112TU	-30	±20	-1.1	-	-	790 (@4V)	390	-	86	150	AEC-Q101
	SSM3J118TU	-30	±20	-1.4	-	-	480 (@4V)	240	-	137	150	AEC-Q101
SSM3J117TU	-30	±20	-2	-	-	225 (@4V)	117	-	280	150	AEC-Q101	

■ USM Package



Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _D (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM3K15FU	30	±20	0.1	-	7000	4000 (@4V)	-	-	7.8	150	AEC-Q101
	SSM3K17FU	50	±7	0.1	-	40000	20000 (@4V)	-	-	7	150	AEC-Q101
	SSM3K7002KFU	60	±20	0.4	-	-	1750	1500	0.39	26	150	AEC-Q101
P-ch	SSM3J15FU	-30	±20	-0.1	-	32000	12000 (@4V)	-	-	9.1	150	AEC-Q101

† With Active clamp

Product Lineups

MOSFETs

■ US6 Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	T _{ch} (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _B (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-chx2	SSM6N35FU	20	±10	0.18	8000 20000 (@1.2V)	4000	3000 (@4V)	-	-	9.5	150	AEC-Q101
	SSM6N43FU	20	±10	0.5	1520	850	660	-	1.23	46	150	AEC-Q101
	SSM6N44FU	30	±20	0.1	-	7000	4000 (@4V)	-	-	8.5	150	AEC-Q101
	SSM6N17FU	50	±7	0.1	-	40000	20000 (@4V)	-	-	7	150	AEC-Q101
	SSM6N7002KFU	60	±20	0.3	-	-	1750	1500	0.39	26	150	AEC-Q101
P-chx2	SSM6P35FU	-20	±10	-0.1	22000 44000 (@1.2V)	11000	8000 (@4V)	-	-	12.2	150	AEC-Q101
	SSM6P15FU	-30	±20	-0.1	-	32000	12000 (@4V)	-	-	9.1	150	AEC-Q101
N-ch+ P-ch	SSM6L35FU	20	±10	0.18	8000 20000 (@1.2V)	4000	3000 (@4V)	-	-	9.5	150	AEC-Q101
		-20	±10	-0.1	22000 44000 (@1.2V)	11000	8000 (@4V)	-	-	12.2	150	

■ ES6 Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	T _{ch} (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _B (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-chx2	SSM6N35FE	20	±10	0.18	8000 20000 (@1.2V)	4000	3000 (@4V)	-	-	9.5	150	AEC-Q101
	SSM6N36FE	20	±10	0.5	1520	850	660	630 (@5V)	1.23	46	150	AEC-Q101
	SSM6N44FE	30	±20	0.1	-	7000	4000 (@4V)	-	-	8.5	150	AEC-Q101
P-chx2	SSM6P35FE	-20	±10	-0.1	22000 44000 (@1.2V)	11000	8000 (@4V)	-	-	12.2	150	AEC-Q101
	SSM6P36FE	-20	±8	-0.33	3600	1600 (@2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM6P15FE	-30	±20	-0.1	-	32000	12000 (@4V)	-	-	9.1	150	AEC-Q101
N-ch+ P-ch	SSM6L35FE	20	±10	0.18	8000 20000 (@1.2V)	4000	3000 (@4V)	-	-	9.5	150	AEC-Q101
		-20	±10	-0.1	22000 44000 (@1.2V)	11000	8000 (@4V)	-	-	12.2	150	
	SSM6L36FE	20	±10	0.5	1520	850	660	630 (@5V)	1.23	46	150	AEC-Q101
		-20	±8	-0.33	3600	1600 (@2.8V)	1310	-	1.2	43	150	

■ SSM Package

Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	T _{ch} (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _B (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM3K35FS	20	±10	0.18	8000 20000 (@1.2V)	4000	3000 (@4V)	-	-	9.5	150	AEC-Q101
	SSM3K36FS	20	±10	0.5	1520	850	660	630 (@5V)	1.23	46	150	AEC-Q101
	SSM3K44FS	30	±20	0.1	-	7000	4000 (@4V)	-	-	8.5	150	AEC-Q101
	SSM3K72KFS	60	±20	0.3	-	-	1750	1500	0.39	26	150	AEC-Q101
P-ch	SSM3J35FS	-20	±10	-0.1	22000 44000 (@1.2V)	11000	8000 (@4V)	-	-	12.2	150	AEC-Q101
	SSM3J36FS	-20	±8	-0.33	3600	1600 (@2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM3J15FS	-30	±20	-0.1	-	32000	12000 (@4V)	-	-	9.1	150	AEC-Q101

■ VESM Package




Polarity	Part Number	Absolute Maximum Ratings			R _{DS(ON)} max (mΩ)				Q _g typ. (nC)	C _{iss} typ. (pF)	T _{ch} (°C)	AEC-Qxxx qualified
		V _{DSS} (V)	V _{GSS} (V)	I _B (A)	V _{GS} =1.5V	V _{GS} =2.5V	V _{GS} =4.5V	V _{GS} =10V				
N-ch	SSM3K35MFV	20	±10	0.18	8000 20000 (@1.2V)	4000	3000 (@4V)	-	-	9.5	150	AEC-Q101
	SSM3K36MFV	20	±10	0.5	1520	850	660	630 (@5V)	1.23	46	150	AEC-Q101
	SSM3K44MFV	30	±20	0.1	-	7000	4000 (@4V)	-	-	8.5	150	AEC-Q101
P-ch	SSM3J35MFV	-20	±10	-0.1	22000 44000 (@1.2V)	11000	8000 (@4V)	-	-	12.2	150	AEC-Q101
	SSM3J66MFV	-20	+6/-8	-0.8	900 4000 (@1.2V)	480	390	-	1.6	100	150	AEC-Q101
	SSM3J15FV	-30	±20	-0.1	-	32000	12000 (@4V)	-	-	9.1	150	AEC-Q101

Product Lineups Standard Logic Devices

■ One-Gate Logic (L-MOS)

VHS Series






General Specification	
Supply voltage range	: 2.0 V to 5.5 V
Output current	: ± 8 mA (@ $V_{CC}=4.5 V$)
Propagation delay time	: 3.7 nsec typ. (@ $V_{CC}=5.0 V$)
Quiescent supply current	: 2 μA max (@ $V_{CC}=5.5 V, T_a=25^\circ C$)
Operating temperature	: Available -40 to 125 $^\circ C$ products

USV (SOT-353)	SMV (SOT-25)	US8 (SOT-765)
		

Function		Part Number						
		Single-gate				Dual-gate		
		USV		SMV		US8	US8	
-	TTL Input	-	TTL Input					
Gates/ Buffers	NAND	TC7SH00FU #	TC7SET00FU #	TC7SH00F #	TC7SET00F #	-	TC7WH00FK #	
	AND		TC7SH08FU #	TC7SET08FU #	TC7SH08F #	TC7SET08F #	-	TC7WH08FK #
		Open-drain	TC7SH09FU #	-	TC7SH09F #	-	-	-
	NOR	TC7SH02FU #	TC7SET02FU #	TC7SH02F #	TC7SET02F #	-	TC7WH02FK #	
	OR	TC7SH32FU #	TC7SET32FU #	TC7SH32F #	TC7SET32F #	-	TC7WH32FK #	
	Exclusive-OR	TC7SH86FU #	-	TC7SH86F #	-	-	-	
	Inverter		TC7SH04FU #	TC7SET04FU #	TC7SH04F #	TC7SET04F #	-	TC7WH04FK # (Triple-gate)
		Unbuffered	TC7SHU04FU #	-	TC7SHU04F #	-	-	TC7WHU04FK # (Triple-gate)
		Schmitt	TC7SH14FU #	TC7SET14FU #	TC7SH14F #	TC7SET14F #	-	TC7WH14FK # (Triple-gate)
	Buffers	Schmitt	TC7SH17FU #	TC7SET17FU #	TC7SH17F #	TC7SET17F #	-	TC7WH17FK # (Triple-gate)
Non-Inverter		TC7SH34FU #	TC7SET34FU #	TC7SH34F #	TC7SET34F #	-	TC7WH34FK # (Triple-gate)	
3-state Buffers		TC7SH125FU #	TC7SET125FU #	TC7SH125F #	TC7SET125F #	-	TC7WH125FK #	
		TC7SH126FU #	TC7SET126FU #	TC7SH126F #	TC7SET126F #	-	TC7WH126FK #	
D-Type Flip-Flop	Preset and Clear	-	-	-	-	TC7WH74FK #	-	
Multiplexers	Digital	-	-	-	-	TC7WH157FK #	-	

SHS Series

General Specification	
Supply voltage range	: 1.65 V to 5.5 V
	: 1.8 V to 5.5 V
Output current	: ± 24 mA (@ $V_{CC}=3.0 V$)
Propagation delay time	: 2.4 nsec typ. (@ $V_{CC}=3.3 V$)
Quiescent supply current	: 1 μA max (@ $V_{CC}=5.5 V, T_a=25^\circ C$)
Operating temperature	: Available -40 to 125 $^\circ C$ products

ESV (SOT-553)	USV (SOT-353)	SMV (SOT-25)	US6 (SOT-363)	US8 (SOT-765)
				

Function		Part Number						
		Single-gate				Dual-gate		
Package		ESV	USV	SMV	US8	US6	US8	
		Gates/ Buffers	NAND	TC7SZ00FE #	TC7SZ00FU #	TC7SZ00F #	-	-
AND	TC7SZ08FE #		TC7SZ08FU #	TC7SZ08F #	-	-	TC7WZ08FK #	
NOR	TC7SZ02FE #		TC7SZ02FU #	TC7SZ02F #	-	-	TC7WZ02FK #	
OR	TC7SZ32FE #		TC7SZ32FU #	TC7SZ32F #	-	-	TC7WZ32FK #	
Exclusive-OR	TC7SZ86FE #		TC7SZ86FU #	TC7SZ86F #	-	-	TC7WZ86FK #	
Inverter			TC7SZ04FE #	TC7SZ04FU #	TC7SZ04F #	-	TC7PZ04FU #	TC7WZ04FK # (Triple-gate)
	Unbuffered		TC7SZU04FE #	TC7SZU04FU #	TC7SZU04F #	-	-	TC7WZU04FK # (Triple-gate)
	Open-drain		TC7SZ05FE #	TC7SZ05FU #	TC7SZ05F #	-	TC7PZ05FU #	TC7WZ05FK # (Triple-gate)
	Schmitt		TC7SZ14FE #	TC7SZ14FU #	TC7SZ14F #	-	TC7PZ14FU #	TC7WZ14FK # (Triple-gate)
Buffers	Open-drain		TC7SZ07FE #	TC7SZ07FU #	TC7SZ07F #	-	TC7PZ07FU #	TC7WZ07FK # (Triple-gate)
	Schmitt	TC7SZ17FE #	TC7SZ17FU #	TC7SZ17F #	-	TC7PZ17FU #	TC7WZ17FK # (Triple-gate)	
Non-Inverter		TC7SZ34FE #	TC7SZ34FU #	TC7SZ34F #	-	TC7PZ34FU #	TC7WZ34FK # (Triple-gate)	
	3-state Buffers	TC7SZ125FE #	TC7SZ125FU #	TC7SZ125F #	-	-	TC7WZ125FK #	
		TC7SZ126FE #	TC7SZ126FU #	TC7SZ126F #	-	-	TC7WZ126FK #	
D-Type Flip-Flop	Preset and Clear	-	-	-	TC7WZ74FK #	-	-	






Compliant with the reliability requirements of AEC-Q100.

Product Lineups

Standard Logic Devices

■ One-Gate Logic (L-MOS)

Bus Switches

USV (SOT-353)	US6 (SOT-363)	US8 (SOT-765)	TSSOP14	TSSOP16	TSSOP20
					

Function	Number of Channel	Part Number	Control input	Package	V _{cc} (V)	T _{opr} (°C)	AEC-Qxxx qualified *
SPST	Single	TC7SB66CFU	High active	USV	1.65 to 5.5	-40 to 125	AEC-Q100
		TC7SB67CFU	Low active	USV	1.65 to 5.5	-40 to 125	AEC-Q100
		TC7SBL66CFU	High active	USV	1.65 to 3.6	-40 to 125	AEC-Q100
		TC7SBL384CFU	Low active	USV	1.65 to 3.6	-40 to 125	AEC-Q100
	Dual	TC7WB66CFK	High active	US8	1.65 to 5.5	-40 to 125	AEC-Q100
		TC7WB67CFK	Low active	US8	1.65 to 5.5	-40 to 125	AEC-Q100
		TC7WBL3305CFK	High active	US8	1.65 to 3.6	-40 to 125	AEC-Q100
		TC7WBL3306CFK	Low active	US8	1.65 to 3.6	-40 to 125	AEC-Q100
	Quad	TC7MBL3125CFT	Low active	TSSOP14	1.65 to 3.6	-40 to 125	AEC-Q100
		TC7MBL3126CFT	High active	TSSOP14	1.65 to 3.6	-40 to 125	AEC-Q100
Octal	TC7MBL3245CFT	Low active	TSSOP20	1.65 to 3.6	-40 to 125	AEC-Q100	
SPDT	Single	TC7SB3157CFU	Output select	US6	1.65 to 5.5	-40 to 125	AEC-Q100
	Quad	TC7MBL3257CFT	Low active	TSSOP16	1.65 to 3.6	-40 to 125	AEC-Q100
SP4T	Dual	TC7MBL3253CFT	Low active	TSSOP16	1.65 to 3.6	-40 to 125	AEC-Q100

Level Shift Bus Switches

Function	Number of Channel	Part Number	Control input	Package	V _{CCA} (V)	V _{CCB} (V)	T _{opr} (°C)	AEC-Qxxx qualified *
SPST	Dual	TC7WPB9306FK	High active	US8	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100
		TC7WPB9307FK	Low active	US8	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100
	Quad	TC7QPB9306FT	High active	TSSOP14	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100
		TC7QPB9307FT	Low active	TSSOP14	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100
SPDT	Dual	TC7MPB9307FT	Low active	TSSOP20	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100
		TC7MPB9326FT	High active	TSSOP14	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100
		TC7MPB9327FT	Low active	TSSOP14	1.65 to 5.0	2.3 to 5.5	-40 to 125	AEC-Q100

* Compliant with the reliability requirements of AEC-Q100.

Product Lineups

Standard Logic Devices

■ Standard Logic 74VHC Series, 74LCX Series (TSSOP14B / 16B / 20B Package products)



- Features**
- Compliant with the reliability requirements of AEC-Q100
 - Operating temperature : Available -40 to 125 °C products
 - Compatible standard TSSOP package

Series name			VHC	VHCT (TTL Input)	VHCV (Schmitt Input)	VHC9 (Schmitt Input)	LCX		
Characteristics and Features	Supply voltage range		2.0 to 5.5 V	4.5 to 5.5 V	1.8 to 5.5 V	2.0 to 5.5 V 4.5 to 5.5 V (VHCT9)	1.65 V to 3.6 V to 5.5 V (05 and 07)		
	Output current @V _{CC} =4.5 V		±8 mA		±16 mA	±8 mA	±24 mA		
	Power down protection on inputs		Yes				Yes		
	Power down protection on outputs		No	Yes		Yes	Yes		
Function			Pin	-	-	-	-		
Gate	NAND	Open-drain	14	74VHC00FT #	74VHCT00AFT #	-	-	74LCX00FT #	
			14	74VHC20FT #	-	-	-	-	
		Schmitt	14	74VHC03FT #	-	-	-	-	-
			14	74VHC132FT #	-	-	-	-	-
	AND	Open-drain	14	74VHC08FT #	74VHCT08AFT #	-	-	74LCX08FT #	
			14	74VHC21FT #	-	-	-	-	
	NOR	Open-drain	14	74VHC02FT #	-	-	-	74LCX02FT #	
			14	74VHC27FT #	-	-	-	-	
	OR	Open-drain	14	74VHC32FT #	74VHCT32AFT #	-	-	74LCX32FT #	
			14	74VHC86FT #	-	-	-	74LCX86FT #	
	Exclusive-OR	Open-drain	14	74VHC04FT #	74VHCT04AFT #	-	-	74LCX04FT #	
			14	74VHC05FT #	-	74VHCV05FT #	-	74LCX05FT #	
	Inverter	6-bit	Open-drain	14	74VHC14FT #	74VHCT14AFT #	74VHCV14FT #	-	74LCX14FT #
				20	-	-	-	74VHC9152FT #	-
		9-bit	Open-drain	14	-	-	74VHCV17FT #	-	-
				14	-	-	74VHCV07FT #	-	74LCX07FT #
	Non-inverter	Open-drain	14	-	-	-	74VHC9151FT #	-	-
			20	-	-	-	-	-	-
	Buffer	3-state	Quad	14	74VHC125FT #	74VHCT125AFT #	-	-	74LCX125FT #
				14	74VHC126FT #	74VHCT126AFT #	-	-	74LCX126FT #
Universal			14	-	-	-	74VHC9125FT # 74VHCT9125AFT #	-	-
			14	-	-	-	74VHC9126FT # 74VHCT9126AFT #	-	-
Octal		Inverted	20	74VHC240FT #	74VHCT240AFT #	74VHCV240FT #	-	74LCX240FT # †	
			20	74VHC540FT #	74VHCT540AFT #	74VHCV540FT #	-	74LCX540FT # †	
		Non-inverted	20	74VHC244FT #	74VHCT244AFT #	74VHCV244FT #	-	74LCX244FT # †	
			20	74VHC541FT #	74VHCT541AFT #	74VHCV541FT #	-	74LCX541FT # †	
Transceiver		Octal	20	-	-	-	74VHC9541FT # 74VHCT9541AFT #	-	-
			20	74VHC245FT #	74VHCT245AFT #	74VHCV245FT #	-	74LCX245FT # †	
Flip-Flop	Dual	14	74VHC74FT #	-	-	-	74LCX74FT #		
		16	74VHC174FT #	-	-	-	-		
	Octal	20	74VHC273FT #	-	-	-	74VHC9273FT # 74VHCT9273FT #	74LCX273FT #	
		20	74VHC374FT #	-	74VHCV374FT #	-	-	74LCX374FT # †	
3-state	Octal	20	74VHC574FT #	74VHCT574AFT #	-	-	74LCX574FT # †		
		20	74VHC373FT #	-	74VHCV373FT #	-	-	74LCX373FT # †	
Latch	3-state	Octal	20	74VHC573FT #	74VHCT573AFT #	74VHCV573FT #	-	74LCX573FT # †	
			20	74VHC165FT #	-	-	-	-	
Multivibrator	Single	3 to 8	16	74VHC123AFT #	-	-	-	-	
			16	74VHC221AFT #	-	-	-	-	
Decoder	Dual	2 to 4	16	74VHC138FT #	74VHCT138AFT #	-	-	74LCX138FT #	
			16	74VHC238FT #	-	-	-	-	
			16	74VHC139FT #	-	-	-	-	
Register	Shift	S-in/P-out	14	74VHC164FT #	-	-	-	-	
			16	-	-	-	74VHC9164FT #	-	
		P-in/S-out	16	74VHC165FT #	-	-	-	-	
			16	74VHC595FT #	-	-	-	74VHC9595FT #	
		3-state	16	74VHC161FT #	-	-	-	-	
Counter	Binary	Async.	16	74VHC163FT #	-	-	-	-	
			14	74VHC393FT #	-	-	-	-	
		Sync.	16	74VHC4020FT #	-	-	-	-	
			16	74VHC4040FT #	-	-	-	-	
		Digital	Dual	16	74VHC153FT #	-	-	-	-
				16	74VHC157FT #	-	-	-	74LCX157FT #
Analog	Quad-2ch	20	-	-	-	-	74LCX257FT #		
		16	74VHC4051AFT #	-	-	-	-		
		16	74VHC4052AFT #	-	-	-	-		
Multi-plexer	Analog	Triple-2ch	16	74VHC4053AFT #	-	-	-	-	
			16	74VHC4066AFT #	-	-	-	-	
Other	Analog switch	14	74VHC4066AFT #	-	-	-	-		

Note: For new designs required high levels of quality and/or reliability, the following product should be used instead of these products.
TC74VHC__FT / TC74LCX__FT

For details, contact your Toshiba sales representative.

† Compliant with the reliability requirements of AEC-Q100.

‡ Datasheet on web site is for consumer and industrial applications. (Operation temperature for consumer and industrial applications is -40 to 85 °C.)

Product Lineups Photocouplers / Photorelays

Diodes

Bipolar Transistors/BRTs

MOSFETs

Standard Logic Devices

Photocouplers/Photorelays

ICs

Packages

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■ Photocouplers

IC Output

Part Number	Pin Configuration	Output Type	Data Rate (Standard)	I_{FHL} max (mA)	Vcc min to max (V) (Note1)	CM min (KV / μ s)	T_{opr} min to max ($^{\circ}$ C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9304		Open-collector	1 Mbps	5	4.5 to 20	+/-15	-40 to 125	3750	5pin SO6	AEC-Q101
TLX9309		Open-collector	1 Mbps	-	to 30	+/-10	-40 to 125	3750	5pin SO6	AEC-Q101
TLX9310		Totem-pole (Buffer)	5 Mbps	1 (I_{FLH})	2.7 to 5.5	+/-25	-40 to 105	3750	5pin SO6	AEC-Q101
TLX9378		Open-collector	10 Mbps	5	4.5 to 5.5	+/-15	-40 to 125	3750	5pin SO6	AEC-Q101
TLX9376		Totem-pole (Inverter)	20 Mbps	4	4.5 to 5.5	+/-15	-40 to 125	3750	5pin SO6	AEC-Q101

Transistor Output

Part Number	Pin Configuration	CTR (I_C/I_F) min to max @ $T_a=25^{\circ}$ C (%)	$V_{CE(sat)}$ max (V)	V_{CE0} min (V)	I_C max (A)	T_{opr} min to max ($^{\circ}$ C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9000		100 to 900	0.4	40	0.05	-40 to 125	3750	SO4	AEC-Q101
TLX9300		100 to 900	0.4	40	0.05	-40 to 125	3750	4pin SO6	AEC-Q101
TLX9291A		50 to 600	0.4	80	0.05	-40 to 125	3750	SO4	AEC-Q101
TLX9185A		50 to 600	0.4	80	0.05	-40 to 125	3750	4pin SO6	AEC-Q101
TLX9188		50 to 600	0.4	200	0.05	-40 to 125	3750	4pin SO6	AEC-Q101

Photovoltaic Output

Part Number	Pin Configuration	I_{sc} min @ $T_a=25^{\circ}$ C (μ A)	V_{oc} min @ $T_a=25^{\circ}$ C (V)	T_{opr} min to max ($^{\circ}$ C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9905		12	7	-40 to 125	3750	4pin SO6	AEC-Q101
TLX9906		12	7	-40 to 125	3750	4pin SO6	AEC-Q101

■ Photorelays

Part Number	Pin Configuration	V_{OFF} max (V)	I_{ON} max (mA)	C_{OFF} typ. (pF)	R_{ON} max (Ω)	I_{FT} max (mA)	T_{opr} min to max ($^{\circ}$ C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9175J		600	15	8	335	3	-55 to 105	3750	4pin SO6	AEC-Q101
TLX9160T		1500	50	100	250	3	-40 to 125	5000	SO16L-T	AEC-Q101

Note1: Recommended Operating Condition

Product Lineups ICs

■ IPDs (Intelligent Power Devices)

High-side Switches

Part Number	Output Channel	Characteristics					Package	Protection			Diagnosis				AEC-Qxxx qualified
		V _{DS} (V)	V _{DD(OPR)} (V)	Output Current (A)	R _{DS(ON)} max/ch @25°C (Ω)	T _{opr} (°C)		Over Current @25°C	Over Temp	Over Voltage (V)	Over Current	Over Temp	Open Load	Battery short	
TPD1052F	1	40	5 to 18	< 0.8	0.8	-40 to 125	PS-8	0.8 A min	150°C min	-	✓	✓	-	-	-
TPD1055FA	1	40	5 to 18	< 3	0.12	-40 to 125	WSO10	3 A min	150°C min	-	✓	✓	✓	✓	AEC-Q100

Low-Side Switches

Part Number	Output Channel	Characteristics					Package	Protection			Diagnosis				AEC-Qxxx qualified
		V _{DD} (V)	V _{(CL)DSS} (V)	Output Current (A)	R _{DS(ON)} max/ch @25°C (Ω)	T _{opr} (°C)		Over Current @25°C	Over Temp	Over Voltage (V)	Over Current	Over Temp	Open Load		
TPD1044F	1	-	41 to 60	< (1)	0.6	-40 to 125	PS-8	1 A min	150°C min	41	-	-	-	-	AEC-Q100
TPD1054F	1	-0.3 to 6.0	40 to 50	< (1)	0.8	-40 to 125	PS-8	1 A min	150°C min	40	✓	✓	✓	✓	**
TPD1058FA	1	-0.3 to 6.0	40 to 60	< (6)	0.1	-40 to 125	WSO10	6 A min	150°C min	40	✓	✓	✓	✓	**

Pre-drivers

Part Number	Function	Output Channel	Characteristics			Package	Protection				Diagnosis			AEC-Qxxx qualified
			V _{DD(OPR)} (V)	Output Current	T _{opr} (°C)		Over Current	Over Voltage	Under Voltage	Reverse Battery	Over Current	Over Voltage	Under Voltage	
TPD7104AF	High-side N-ch MOSFET Gate driver	1	5 to 18	Depends on internal drive	-40 to 125	PS-8	Adjustable	-	-	✓	✓	-	-	AEC-Q100
TPD7106F		1	4.5 to 27	OUT1: +/-10 mA OUT2: 0.4 A (Sink)	-40 to 150	SSOP-16	-	-	-	✓	-	-	-	AEC-Q100
TPD7107F		1	5.75 to 26	Source: 100 μA Sink: 5 mA or 270 mA	-40 to 125	WSO10A	✓	✓	✓	✓	✓	✓	✓	AEC-Q100
TPD7211F	Half-bridge MOSFET Gate driver	2	5 to 18	±0.5 A max	-40 to 125	PS-8	-	-	-	-	-	-	-	-
TPD7213FN*		2	V _{DD} 9 to 18 V _{DD48} 12 to 54	Source: 2 A Sink: 2 A	-40 to 150	SSOP-16	-	-	✓	-	-	-	✓	**
TPD7212F	3 Phase Full-bridge MOSFET Gate driver	6	4.5 to 18	Source: 1 A Sink: 1.5 A	-40 to 150	WQFN32	-	✓	✓	-	-	✓	✓	AEC-Q100
TPD7212FN		6	4.5 to 18	Source: 1 A Sink: 1.5 A	-40 to 150	SSOP30	-	✓	✓	-	-	✓	✓	AEC-Q100










* Under development (The specification is subject to change without notice.), ** Under Consideration

Product Lineups

ICs

Motor Driver ICs

Brushed Motor Drivers

Part Number	Package	Functions	Characteristics			Remarks	Supply Voltage (V)	AEC-Qxxx qualified
			Output Current max (A)	Input Voltage max (V)	Power Dissipation max (W)			
TB9101FNG	SSOP24 -0.65 	2ch H-Bridge Motor Driver	±1	40 (1s)	1.32	Diagnostic function, standby function, P-ch + N-ch=1.2 Ω typ.	7 to 18	AEC-Q100
TB9102FNG	SSOP24 -0.65 	6ch Half/3ch H-Bridge Motor Driver	±1	40 (1s)	1.32	SPI communications, Diagnostic function, P-ch + N-ch=1.0 Ω typ.	7 to 18	AEC-Q100
TB9051FTG	P-QFN28 -0.65 	1ch H-Bridge Motor Driver	±5	40 (0.5s)	4.7	DC motor driver IC in a small package that is capable of controlling the throttle and other valves of a vehicle engine Open/close control for engine throttle and other valves	4.5 to 28	AEC-Q100
TB9052FNG	HTSSOP48 -0.5 	H-Bridge Motor Pre-Driver	±1	40 (1s)	3.8	H Bridge FET Driver of the external type. Sequence control logic. Motor current detection circuit. Various self-diagnostic function.	6 to 18	AEC-Q100
TB9053FTG	P-LQFN40-0606-0.50-001 	2ch H-Bridge Motor Driver	±5 (±10 1ch mode)	40 (0.5s)	6.07	PWM-type, 5 A dual-channel, H-bridge,/1-channel 10A H-bridge driver, SPI communication(motor control enabled) Open/close control for engine throttle, Motor drive system that requires PWM control, such as door latch	4.5 to 28	AEC-Q100
TB9054FTG	P-VQFN40-0606-0.50-004 	2ch H-Bridge Motor Driver	±5 (±10 1ch mode)	40 (0.5s)	5.18	PWM-type, 5 A dual-channel, H-bridge,/1-channel 10A H-bridge driver, SPI communication(motor control enabled) Open/close control for engine throttle, Motor drive system that requires PWM control, such as door latch	4.5 to 28	AEC-Q100
TB9056FNG	SSOP24 -0.65 	LIN 1.3 Slave (Classic Check sum) H-Bridge Motor Driver	±0.3	40 (1s)	1.32	LIN 1.3 Slave IC (Classic Check sum) R _{on} (H-bridge: P-ch + N-ch) = 2.2 Ω typ. Potentiometer support	7 to 18	-
TB9057FG	LQFP48 -0.5 	H-Bridge Motor Pre-Driver	±1	40 (1s)	2	H Bridge FET Driver of the external type. Sequence control logic. Motor current detection circuit. Various self-diagnostic function.	5 to 21	AEC-Q100
TB9058FNG	SSOP24 -0.65 	LIN 1.3 Slave (Enhanced Check sum) H-Bridge Motor Driver	±0.3	40 (1s)	1.32	LIN 1.3 Slave IC (Enhanced Check sum) R _{on} (H-bridge: P-ch + N-ch) = 2.2 Ω typ. Potentiometer support	7 to 18	AEC-Q100

Product Lineups ICs

Diodes

Bipolar Transistors/BRTs

MOSFETs

Standard Logic Devices








Photocouplers/Photorelays

ICs


Packages

Motor Driver ICs

Brushless Motor Drivers

Part Number	Package	Functions	Remarks	Supply Voltage (V)	AEC-Qxxx qualified
TB9061AFNG	SSOP24 -0.65 	Sensor-less control with 120 degree commutation, Motor Pre-Driver	3-phase,full-wave sensor-less drive PWM pulse input control/DC level input control (selectable) Comparator for induced voltage detection Thermal shutdown, overcurrent detection, over voltage detection Output PWM Dynamic range expansion	5.5 to 18	AEC-Q100
TB9062FNG	SSOP24 -0.65 	Sensor-less control with 120 degree commutation, Motor Pre-Driver	3-phase,full-wave sensor-less drive PWM pulse input control Comparator for induced voltage detection Thermal shutdown, overcurrent detection, over/under voltage detection Output PWM Dynamic range expansion Automatic PWM duty control at startup, Automatic soft speed changing control	8 to 16	-
TB9067FNG	SSOP24 -0.65 	Motor Pre-Driver of P-ch/N-ch with 120 degree commutation,	Only a few external parts required, Support for both PWM and DC inputs 120-degree commutation, 5-V sensor comparator	6 to 18	-
TB9068FG	LQFP48 -0.5 	Motor Driver with a LIN transceiver	LIN 1.3-based transceiver $R_{on} = 1.8 \Omega$ typ. 120-degree commutation logic MODE SELECTION for MOTOR CONTROL	7 to 18	-
TB9080FG	LQFP64 -0.5 	Motor Pre-Driver for sine-wave control	Supports both PWM and DC inputs for sine-wave driver logic. Motor RPM feedback, auto lead angle correction Abnormal condition detection such as overcurrent, overvoltage, overtemperature and motor lock Sleep mode	7 to 18	AEC-Q100
TB9081FG	LQFP64 -0.5 	3-Phase Brushless Motor Pre-Driver	New three-phase motor pre-driver IC designed for high-current applications such as electric power assisted steering (EPS) 5ch safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	4.5 to 28	AEC-Q100
TB9083FTG	P-VQFN48 -0.5 	3-Phase Brushless Motor Pre-Driver	New 3-phase motor pre-driver IC designed for high-current applications such as electric power assisted steering (EPS) 3ch safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, $T_j=175$ degrees	4.5 to 28	AEC-Q100

Stepping Motor Driver




Part Number	Package	Functions	Remarks	Supply Voltage (V)	AEC-Qxxx qualified
TB9120AFTG	P-VQFN28 -0.65 	2-Phase Bipolar Stepping Motor Driver with a clock input interface	Constant-current PWM control, Micro step drive, Supporting up to 1/32 steps, Stall detection, Mixed decay mode, Wettable pins with excellent solderability	7 to 18	AEC-Q100

* Under development (The specification is subject to change without notice.)


Product Lineups ICs

Diodes
Bipolar Transistors/BRTs
MOSFETs
Standard Logic Devices
Photocouplers/Photoarrays
ICs
Packages

■ System Power Supply ICs

Part Number	Package	Functions	Characteristics			Remarks	Supply Voltage (V)	AEC-Qxxx qualified
			Output Voltage typ. (V)	Input Voltage max (V)	Power Dissipation max (W)			
TB9005FNG	SSOP20 -0.65 	CPU voltage regulator, watchdog timer	5	45(1s)	0.68	Low current consumption:90 μA typ. Watchdog timer enable / disable Reset detection:4.7 V or 4.2 V (selectable) External transistor required	6 to 18	AEC-Q100
TB9044AFNG	HTSSOP48 -0.5 	Multiple-output regulator for CPU Watchdog timer SPI I/F	5(Reg) 5(Tracker) 5(Tracker)	40(1s)	3.84	Buck / Boost Switching regulator and series regulator and tracker Over and under voltage detection, current limiter, over temperature detection.	2.7 to 28	AEC-Q100
TB9045FNG series	HTSSOP48 -0.5 	Multiple-output regulator for CPU Watchdog timer SPI I/F	5(Reg) 5(Tracker) 5(Tracker) 1.25/1.2/1.1 (Reg)	40(1s)	3.84	Buck / Boost Switching regulator and series regulator and tracker Over and under voltage detection, current limiter, over temperature detection. 1.5 V / 1.25 V / 1.2 V / 1.1 V selectable output for CPU core.	2.7 to 28	AEC-Q100

■ Buffering ICs for Inverter

Part Number	Package	Functions	Remarks	Supply Voltage (V)	AEC-Qxxx qualified †
TC74VHC9363FT TC74VHC9364FT	TSSOP20B 	Dual 3 bit buffer for control signal of High-side and Low-side circuits.	For use between MCU and Pri driver IC When either /GHN or /GLN are high, the terminal outputs are in the low level(TC74VHC9363) and high level(TC74VHC9364). All inputs have pull-up, pull-down resistance and schmitt trigger function. All inputs are 5.5 V Tolerant	2.0 to 5.5	AEC-Q100

■ Signal Level Translation & Buffering ICs



Part Number	Package	Bit Width	Functions	V _{CCA} (V)	V _{CCB} (V)	Remarks	AEC-Qxxx qualified †
TC7MP3125FT	TSSOP16B	4	Dual-Supply Bus Transceiver. Bi-directional transmission possible by DIR terminal control.	1.1 to 2.7	1.65 to 3.6	Translation voltage range is 1.1 to 3.6 V Ideal for high load drive with buffer type output structure All I/Os are 3.6V Tolerant	AEC-Q100
TC7MPN3125FT	TSSOP16B	4	Dual-Supply Bus Transceiver. Bi-directional transmission possible by DIR terminal control.	1.1 to 2.7	1.65 to 3.6	Low Noise (10 dB reduction compared with TC7MP3125 series)	AEC-Q100
TC7WP3125FK	US8	2	Dual-Supply Bus Buffer. Uni-directional type level up conversion IC.	1.1 to 2.7	1.65 to 3.6	Translation voltage range is 1.1 to 3.6 V Ideal for high load drive with buffer type output structure All I/Os are 3.6V Tolerant	AEC-Q100
TC7WPN3125FK	US8	2	Dual-Supply Bus Buffer. Uni-directional type level up conversion IC.	1.1 to 2.7	1.65 to 3.6	Low Noise (10 dB reduction compared with TC7MP3125 series)	AEC-Q100
74LVC2T45FK*	US8	2	Dual-Supply Bus Transceiver. Bi-directional transmission possible by DIR terminal control.	1.65 to 5.5	1.65 to 5.5	Translation voltage range is 1.65 to 5.5 V Ideal for high load drive with buffer type output structure All I/Os are 5.5 V Tolerant	**

Part Number	Package	Bit Width	Functions	V _{CC} (V)	Control Input	Remarks	AEC-Qxxx qualified †
74LV4T125FT	TSSOP14B	4	Single Power Supply Undirection Level Shifter IC(Level Up and Down).	1.65 to 5.5	Active low	<UP Translation> 1.2 V→1.8 V @V _{CC} =1.8 V 1.5 V→2.5 V @V _{CC} =2.5 V 1.8 V→3.3 V @V _{CC} =3.3 V 3.3 V→5.0 V @V _{CC} =5.0 V	AEC-Q100
74LV4T126FT	TSSOP14B	4	Quadruple Buffer With 3-State Output.		Active High	<Down translation> 3.3 V→1.8 V @V _{CC} =1.8 V 3.3 V→2.5 V @V _{CC} =2.5 V 5.0 V→3.3 V @V _{CC} =3.3 V	AEC-Q100

* Under development (The specification is subject to change without notice), ** Under Consideration
† Compliant with the reliability requirements of AEC-Q100.

Product Lineups ICs

■ Ethernet Bridge ICs

Part Number	Package	Host (External application) I/F	Automotive I/F		Audio I/F	Peripheral I/F	CPU Core	Supply Voltage (V)	AEC-Qxxx qualified	
			Ethernet AVB [IEEE802.1AS, IEEE802.1Qav]	Ethernet TSN [IEEE802.1Qbv, IEEE802.1Qbu, IEEE802.3br]						MAC-PHY I/F
TC9560XBG	PLFBGA170	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	-	RGMII /RMII /MII	I2S / TDM	I2C/SPI Quad-SPI UART, GPIO, INT	Arm® Cortex®-M3	1.8 / 3.3 for IO 1.8 / 2.5 / 3.3 for RGMII / RMII / MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9560BXBG	PLFBGA170	HSIC I/F (480 Mbps)	✓	-	RGMII /RMII /MII	I2S / TDM	I2C/SPI Quad-SPI UART, GPIO, INT	Arm® Cortex®-M3	1.8 / 3.3 for IO 1.2 for HSIC 1.8 / 2.5 / 3.3 for RGMII / RMII / MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9562XBG	PLFBGA120	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	-	RGMII /RMII /MII	I2S / TDM	I2C/SPI Quad-SPI UART, GPIO, INT	Arm® Cortex®-M3	1.8 / 3.3 for IO 1.8 / 2.5 / 3.3 for RGMII / RMII / MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9562AXBG	PLFBGA120	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	-	RGMII /RMII /MII /SGMII	I2S / TDM	I2C/SPI Quad-SPI UART, GPIO, INT	Arm® Cortex®-M3	1.8 / 3.3 for IO 1.8 / 2.5 / 3.3 for RGMII / RMII / MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9562BXBG	PLFBGA120	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	✓	RGMII /RMII /MII /SGMII	I2S / TDM	I2C/SPI Quad-SPI UART, GPIO, INT	Arm® Cortex®-M3	1.8 / 3.3 for IO 1.8 / 2.5 / 3.3 for RGMII / RMII / MII 1.8 for SGMII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9563XBG	PFBGA220	PCIe® I/F Gen3.0(8GT/s) 3 ports switch Upstream: 1 port x 4 lanes Downstream: 2 ports each x1 lane	✓	✓	USXGMII /XFI /SGMII /RGMII	-	I2C/SPI / UART / GPIO / INT	Arm® Cortex®-M3	1.8 / 3.3 for IO 1.8 for USXGMII /XFI /SGMII / RGMII 1.8 for PCIe / PLL / OSC 0.9 for Core	**

■ Peripheral Bridge ICs

Part Number	Package	Type	Input	Output	Resolution	Operating Temperature (°C)	AEC-Qxxx qualified
TC9590XBG	P-LFBGA64	H2C	HDMI® 1.4a	MIPI® CSI-2 4 lane x 1ch	-	-40 to 85	AEC-Q100
TC9591XBG	P-VFBGA80	CPLB	MIPI® CSI-2 4 lane x 1ch Parallel Input 24bit @166 MHz	Parallel Output 24bit@100MHz MIPI® CSI-2 4 lane x 1ch	-	-40 to 105	AEC-Q100
TC9592XBG	P-VFBGA49	D2L - LP	MIPI® DSI 4 lane x 1ch	LVDS Single Link (5pairs/link)	UXGA 1600 x 1200 24bit	-40 to 85	-
TC9593XBG	P-VFBGA64	D2L - LP	MIPI® DSI 4 lane x 1ch	LVDS Dual Link (5pairs/link)	WUXGA 1920 x 1200 24bit	-40 to 85	AEC-Q100
TC9594XBG	P-VFBGA80	CPLB	Parallel Input 24bit @166 MHz	MIPI® DSI 4 lane x 1ch	WUXGA 1920 x 1200 24bit	-40 to 105	AEC-Q100
TC9595XBG	P-VFBGA80	D2DP	MIPI® DSI 4 lane x 1ch Parallel Input 24bit @154 MHz	DisplayPort™ 1.1a	WUXGA 1920 x 1200 24bit	-40 to 85	AEC-Q100

** Under consideration

Product Lineups

ICs

Diodes

Bipolar Transistors/BRTs

MOSFETs

Standard Logic Devices




Photocouplers/Photoarrays

ICs




Packages

55



■ Video Processor

Part Number	Package	Function	Input Signal Format/ Others	Display System	Operating Temperature (°C)	Supply Voltage (V)	AEC-Qxxx qualified
TC90197XBG	P-LBGA256 	2 pictures processing Quick view for rear camera picture Up/down Scaling function / Split screen display Parking assist (guide line/OSD) Picture quality improvement	Analog: CVBS-3 / YCbCr-2 or RGB-2/ LVTTL: D-RGB-1 / D-RGB-2 or BT.601, BT.656 Video decoder 2ch (ADC 8bit 4ch)	WVGA	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90193SBG	P-FBGA228 	Single pictures processing Quick view for rear camera picture Parking assist (guide line/OSD) Picture quality improvement	Analog: CVBS-1 LVTTL: D-RGB / BT.656 Video decoder 1ch (ADC 8bit 1ch)	QVGA WQVGA WVGA	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90193ASBG	P-FBGA228 	Single pictures process Quick view for rear camera picture Picture quality improvement Mute less picture output at switch of input signal (CVBS⇔Digital)	Analog: CVBS-1 LVTTL: D-RGB Video decoder 1ch (ADC 8bit 1ch)	QVGA WQVGA WVGA	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-

■ Video Decoder ICs

Part Number	Package	Function	ADC	Color Decoder (S)	New Picture Adjustment	ITU-R BT. 601 Output	ITU-R BT. 656 Output	Operating Temperature (°C)	Supply Voltage (V)	AEC-Qxxx qualified
TC90105FG	LQFP80 	2ch Video decoder with 2.5 V Regulator	2	2	✓	✓	✓	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90107FG	LQFP64 	Video decoder with 2.5 V Regulator	1	1	✓	-	✓	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90106FG	LQFP64 	Video decoder with Component Input interface (up to 525p/625p)	3	1	-	-	✓ (Pseudo 656 output for 525p/625p input mode)	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-

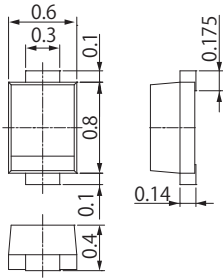
■ Audio Amp ICs

Part Number	Package	Function	Voltage Gain	I2C Bus	Output DC offset detection	Clip Detection	Short Circuit Detection	Half Short Detection	2Ω Load	6V Crusing	Operating Temperature (°C)	Supply Voltage (V)	AEC-Qxxx qualified
TCB701FNG	P-HSSOP36 	49W max. BTL x 4ch audio amp Toshiba original High efficiency amplifier (TB-class) Built-in Self-diagnostics	26 dB / 16 dB	✓	✓	✓	✓	✓	✓	✓	-40 to 85	6.0 to 18	AEC-Q100
TCB702FNG	P-HSSOP36 	45W max. BTL x 4ch audio amp Toshiba original High efficiency amplifier (TB-class) Built-in Self-diagnostics	26 dB / 16 dB	✓	✓	✓	✓	✓	-	✓	-40 to 85	6.0 to 18	AEC-Q100

Product Lineups Packages

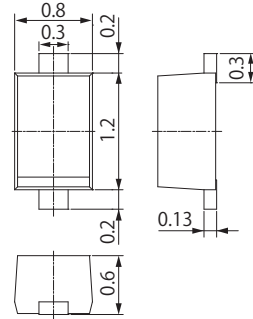
SOD-923

Package dimension unit: mm



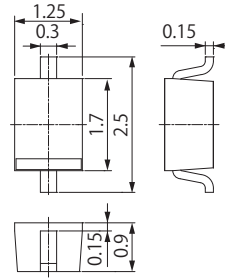
ESC (SOD-523)

Package dimension unit: mm



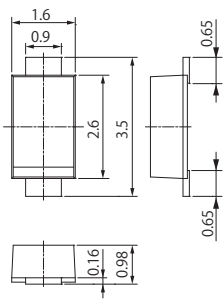
USC (SOD-323)

Package dimension unit: mm



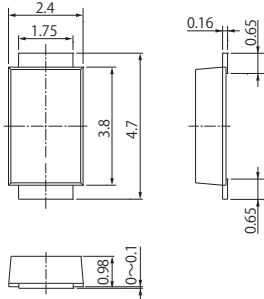
S-FLAT™

Package dimension unit: mm



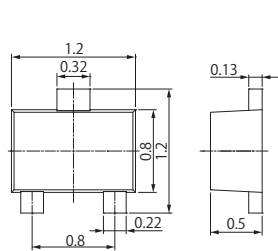
M-FLAT™

Package dimension unit: mm



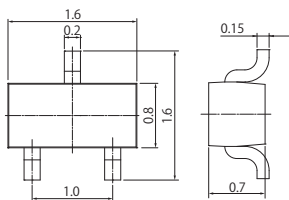
VESM (SOT-723)

Package dimension unit: mm



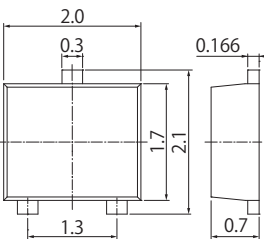
SSM (SOT-416)

Package dimension unit: mm



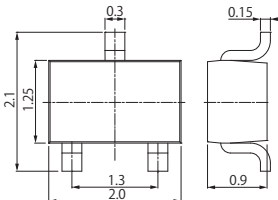
UFM (SOT-323F)

Package dimension unit: mm

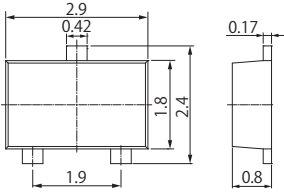
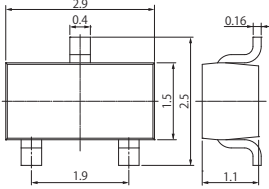
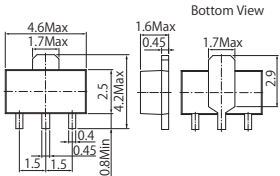


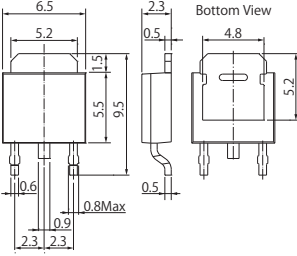
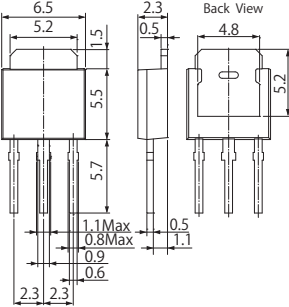
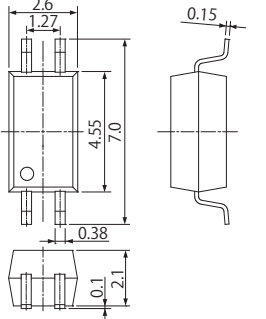
USM (SOT-323)

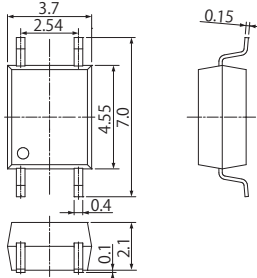
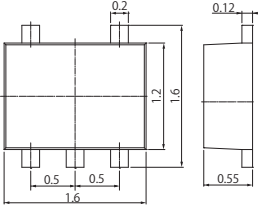
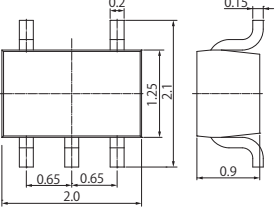
Package dimension unit: mm



Product Lineups Packages

SOT-23F		S-Mini (SOT-346)		PW-Mini	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm
					

DPAK+ / New PW-Mold		New PW-Mold2		SO4	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm
					

4pin SO6		ESV (SOT-553)		USV (SOT-353)	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm
					

Product Lineups Packages

Diodes

Bipolar Transistors/BRTs

MOSFETs

Standard Logic Devices

Photocouplers/Photorelays

ICs

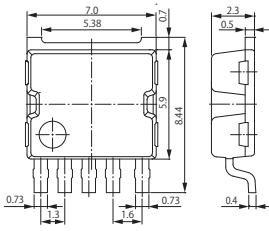
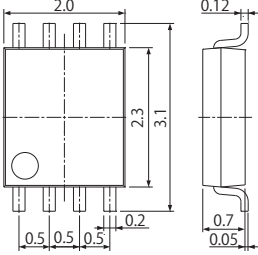
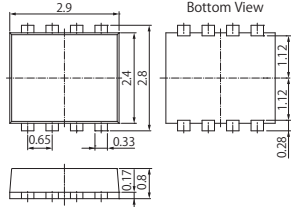
Packages

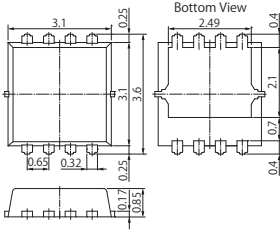
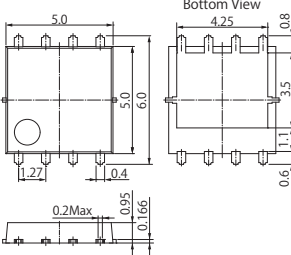
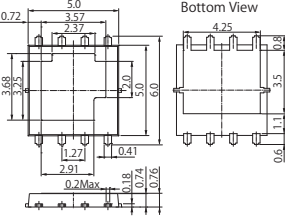
SMV (SOT-25)		5pin SO6		ES6 (SOT-563)	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm

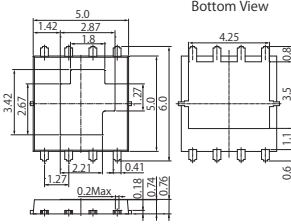
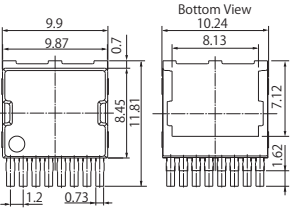
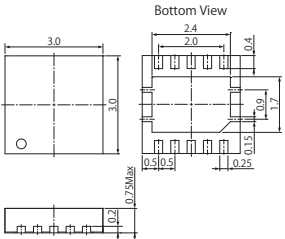
UDFN6 (SOT-1118)		UDFN6B (SOT-1220)		DFN2020 (WF)	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm

UF6 (SOT-363F)		US6 (SOT-363)		TSOP6F	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm

Product Lineups Packages

S-TOGL™		US8 (SOT-765)		PS-8	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm
					

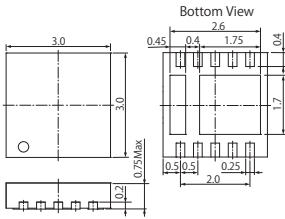
TSON Advance (WF)		SOP Advance (WF)		DSOP Advance (WF)L	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm
					

DSOP Advance (WF)M		L-TOGL™		WSN10	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm
					

Product Lineups Packages

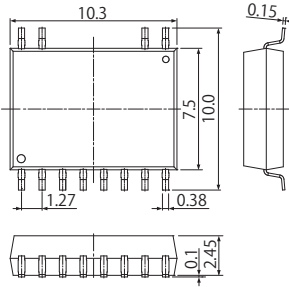
WSON10A

Package dimension unit: mm



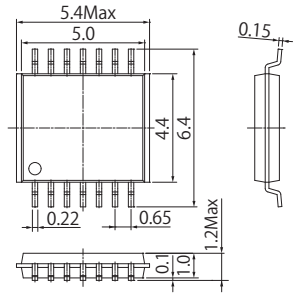
SO16L-T

Package dimension unit: mm



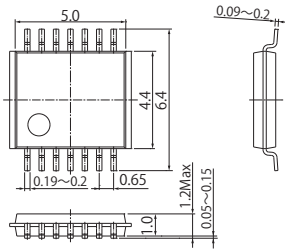
TSSOP14

Package dimension unit: mm



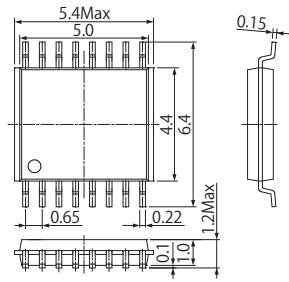
TSSOP14B

Package dimension unit: mm



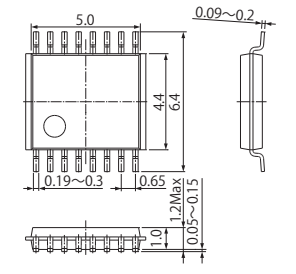
TSSOP16

Package dimension unit: mm



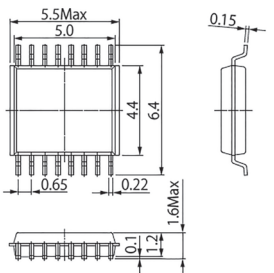
TSSOP16B

Package dimension unit: mm



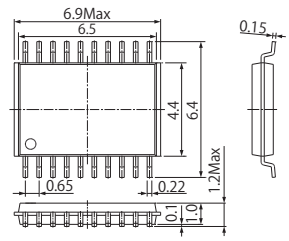
SSOP16

Package dimension unit: mm



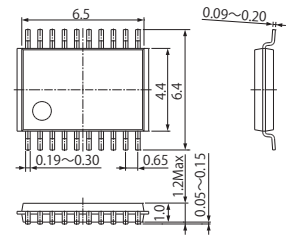
TSSOP20

Package dimension unit: mm



TSSOP20B

Package dimension unit: mm



Product Lineups Packages

SSOP30		WQFN32	
Package dimension	unit : mm	Package dimension	unit : mm

Product Lineups Packages

Diodes

Bipolar Transistors/BRTs

MOSFETs

Standard Logic Devices

Photocouplers/Photorelays

ICs

Packages

SSOP20-0.65		SSOP24-0.65		P-HSSOP36	
Package dimension	unit: mm	Package dimension	unit: mm	Package dimension	unit: mm

HTSSOP48-0.5		LQFP48-0.5		LQFP64	
Package dimension	unit: mm	Package dimension	unit: mm	Package dimension	unit: mm

Product Lineups Packages

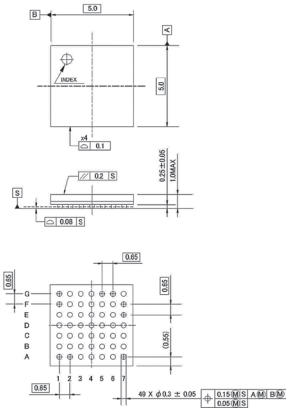
LQFP80		P-VQFN28-0.65		P-QFN28-0.65	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm

P-VQFN40		P-LQFN40		P-VQFN48-0.5	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm

Product Lineups Packages

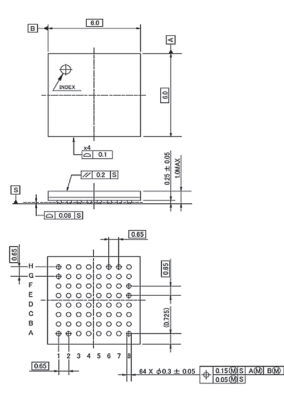
P-VFPGA49

Package dimension unit: mm



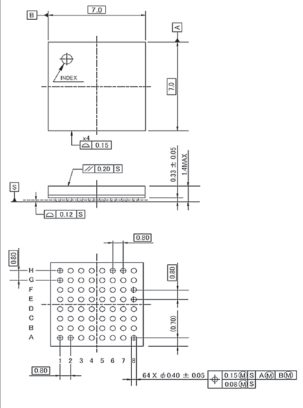
P-VFPGA64

Package dimension unit: mm



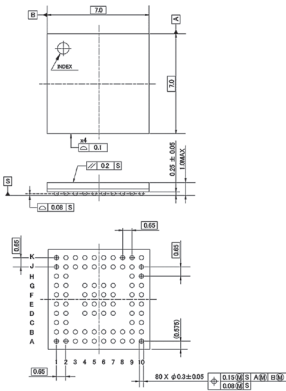
P-LFPGA64

Package dimension unit: mm



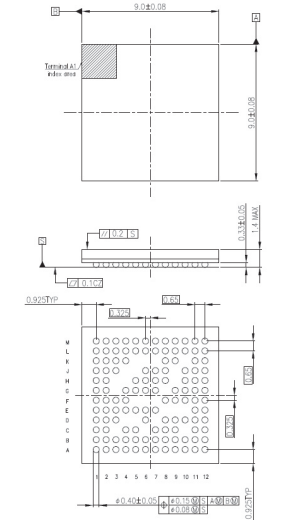
P-VFPGA80

Package dimension unit: mm



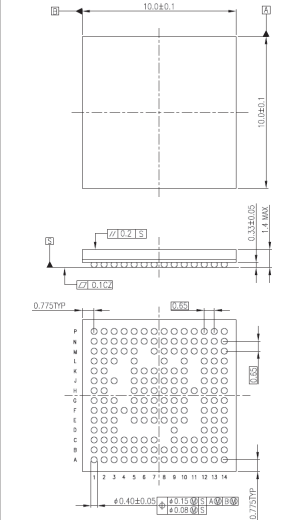
PLFPGA120

Package dimension unit: mm



PLFPGA170

Package dimension unit: mm



Diodes

Bipolar Transistors/BRTs

MOSFETs

Standard Logic Devices

Photocouplers/Photorelays

ICs

Packages

Product Lineups Packages

PFBGA220		P-FBGA228		P-LBGA256	
Package dimension	unit : mm	Package dimension	unit : mm	Package dimension	unit : mm

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