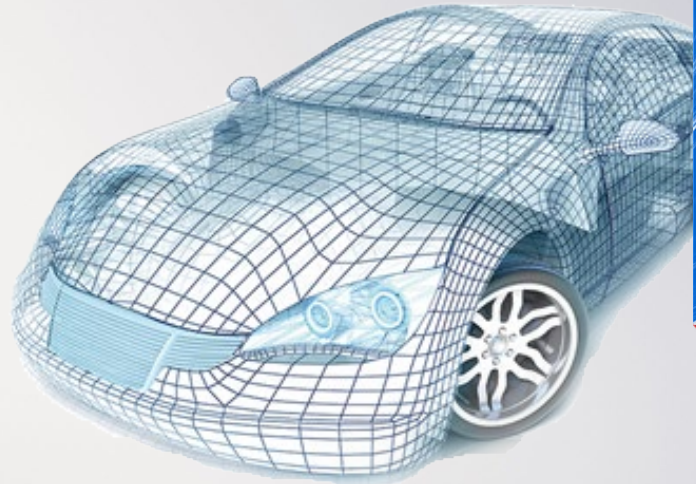


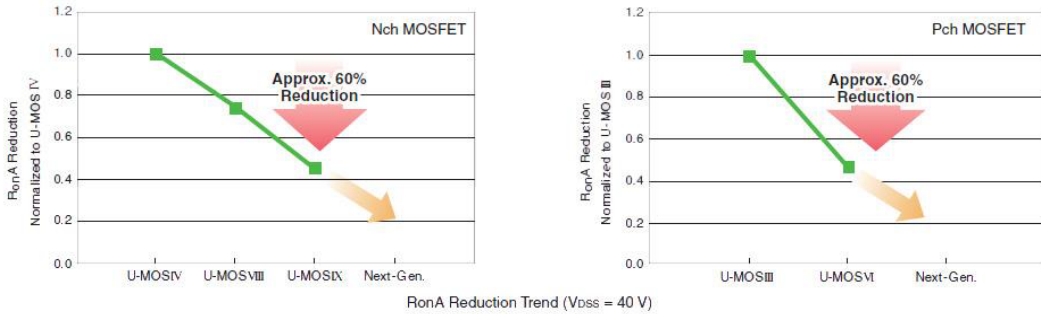
Power MOSFET



For Automotive

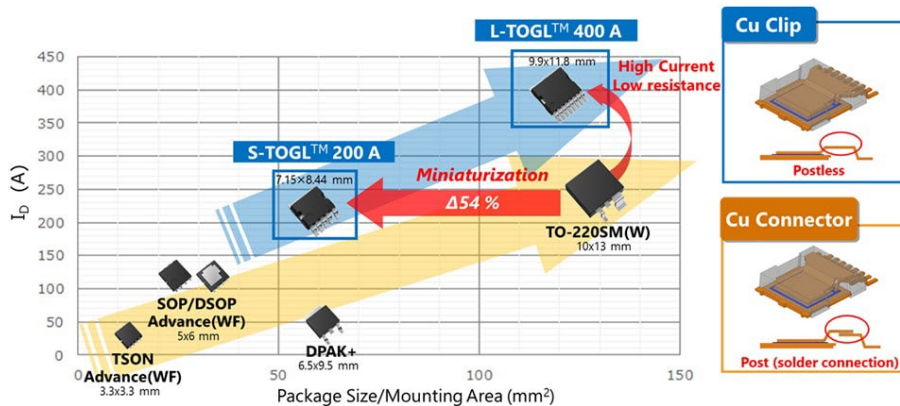
Toshiba offers an extensive line-up of power MOSFETs for various automotive applications including 48V battery systems. The combination of low ON-resistance and advanced package technology makes Toshiba's power MOSFETs an ideal solution for reducing system losses, thereby contributing to energy-saving in automotive applications. All MOSFETs on this leaflet are qualified to AEC-Q101 or are under AEC-Q101 qualification.

Reduced $R_{ON}A$ due to the small-geometry trench process



Copper (Cu) connector and clip bonding

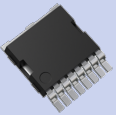
SOP/DSOP Advance(WF), TSON Advance(WF) and DPAK+ use copper(Cu) connectors instead of conventional aluminium wire bonding. The newly developed S-TOGL™ and L-TOGL™ adopt the Cu clip structure (postless structure), which is an evolution of the Cu connector structure, to achieve further improvement in high current performance. The Cu connector and clip contribute to the reduction of the package resistance and inductance.




Automotive Power MOSFET line-up

Package	Polarity	Process	V _{DSS} (V)	Part no.	R _{DS(ON)} max (mΩ)		I _D (DC) (A)	P _D (W)	Qg typ (nC)	AEC-Q101
					V _{GS} =10V (-10V Pch)	V _{GS} =4.5V/6V (-4.5V/-6V Pch)				


L-TOGL™ package (9.9mm x 11.8mm)

	Nch	UMOS9	40	XPQR3004PB	0.3	0.47@6V	400	750	295	✓	
				XPQ1R004PB	1.0	1.8@6V	200	230	84	✓	
		UMOS10	80	XPQR8308QB	0.83	1.23@6V	350	750	305	✓	NEW
				(S1TC5)	(3.34)	(4.9@6V)	(130)	(230)	(79)	*	
			100	XPQ1R00AQB	1.03	1.93@6V	300	750	269	✓	NEW
				(S1RP5)	(4.08)	(8.0@6V)	(100)	(230)	(77)	*	

S-TOGL™ Package (7.15mm x 8.44mm)

	Nch	UMOS9	40	XPJR6604PB	0.66	1.16@6V	200	375	128	✓	NEW
				XPJ1R004PB	1.0	1.8@6V	160	223	84	✓	NEW


DPAK+ package (6.5mm x 9.5mm)

	Nch	UMOS9	40	TK1R4S04PB	1.35	1.90@6V	120	180	103	✓			
				UMOS8	40	TK100S04N1L	2.3	4.5@4.5V	100	157	76	✓	
						TK65S04N1L	4.3	7.8@4.5V	65	107	39	✓	
						TK15S04N1L	17.8	37@4.5V	15	46	10	✓	
		UMOS8	60			TK90S06N1L	3.3	5.2@4.5V	90	157	81	✓	
				TK40S06N1L	10.5	18@4.5V	40	88	26	✓			
				TK25S06N1L	18.5	36.8@4.5V	25	57	15	✓			
				UMOS8	100	TK60S10N1L	6.11	9.25@6V	60	180	60	✓	
		TK55S10N1	6.5			-	55	157	49	✓			
		TK33S10N1Z	9.7			-	33	125	28	✓			
		TK33S10N1L	9.7			16.2@4.5V	33	125	33	✓			
		UMOS8	100	TK11S10N1L	28	50@4.5V	11	65	15	✓			
				TK7S10N1Z	48	-	7	50	7.1	✓			
				Pch	UMOS6	-40	TJ90S04M3L	4.3	6.0@-4.5V	-90	180	172	✓
							TJ80S04M3L	5.2	7.9@-6V	-80	100	158	✓
		TJ60S04M3L	6.3				9.4@-6V	-60	90	125	✓		
	TJ40S04M3L	9.1	13@-6V				-40	68	83	✓			
	-60	TJ20S04M3L	22.2			32@-6V	-20	41	37	✓			
		TJ10S04M3L	44			62@-6V	-10	27	19	✓			
		TJ60S06M3L	11.2			14.5@-6V	-60	100	156	✓			
TJ50S06M3L		13.8	17.4@-6V			-50	90	124	✓				
-60	TJ30S06M3L	21.8	28@-6V	-30	68	80	✓						
	TJ15S06M3L	50	63@-6V	-15	41	36	✓						
				TJ8S06M3L	104	130@-6V	-8	27	19	✓			


* Under development

Package	Polarity	Process	VDSS (V)	Part no.	R _{DS(ON)} max (mΩ)		ID(DC) (A)	PD (W)	Qg typ (nC)	AEC-Q101
					VGS=10V (-10V Pch)	VGS=6V (-4.5V Pch)				


DSOP Advance (WF)L package (5mm x 6mm)

	Nch	UMOS9	40	TPWR7904PB	0.79	1.3	150	170	85	✓
		UMOS10	80	(XPW2R408QB)	(2.4)	(3.5)	(120)	(170)	(94)	*
		UMOS8	100	XPW4R10ANB	4.1	6.2	70	170	75	✓


DSOP Advance (WF)M package (5mm x 6mm)

	Nch	UMOS9	40	TPW1R104PB	1.14	1.96	120	132	55	✓
		UMOS10	80	(XPW3R908QB)	(3.9)	(5.6)	(80)	(132)	(63)	*
		UMOS8	100	XPW6R30ANB	6.3	9.5	45	132	52	✓

SOP Advantage (WF) package (5mm x 6mm)

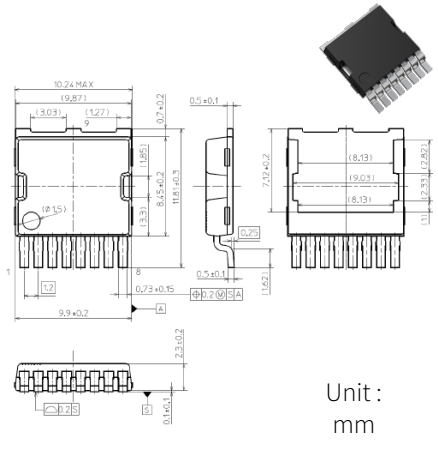
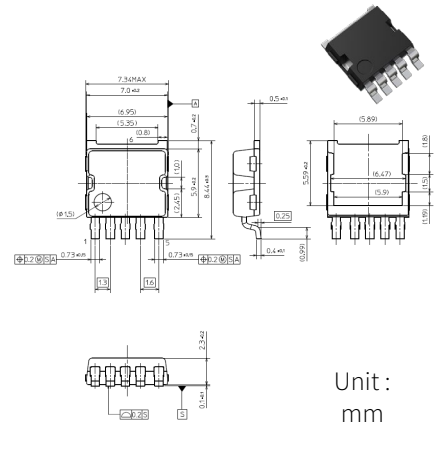
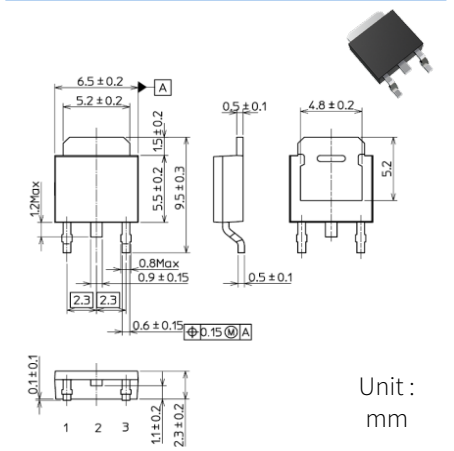
	Nch	UMOS9	40	XPHR7904PS	0.79	1.3	150	170	85	✓
				XPHR9904PS	0.99	1.42	130	153	83	✓
				XPH1R104PS	1.14	1.96	120	132	55	✓
				XPH2R404PS	2.4	4.1	90	93	40	✓
				XPH3R304PS	3.3	6.3	60	76	30	✓
		UMOS8	60	XPH2R106NC	2.1	4.1@4.5V	110	170	104	✓
				XPH3R206NC	3.2	6.2@4.5V	70	132	65	✓
		UMOS10	80	(XPH2R408QB)	(2.4)	(3.5)	(120)	(170)	(94)	*
				(XPH3R908QB)	(3.9)	(5.6)	(80)	(132)	(63)	*
		UMOS8	100	XPH4R10ANB	4.1	6.2	70	170	75	✓
	XPH6R30ANB			6.3	9.5	45	132	52	✓	
	Pch	UMOS6	-40	XPH3R114MC	3.1	4.7@4.5	-100	170	230	✓
				XPH4R714MC	4.7	6.9@4.5	-60	132	160	✓
			-60	XPH8R316MC	8.3	10.2@4.5	-90	170	222	✓
XPH13016MC				12.9	16.6@4.5	-60	132	148	✓	

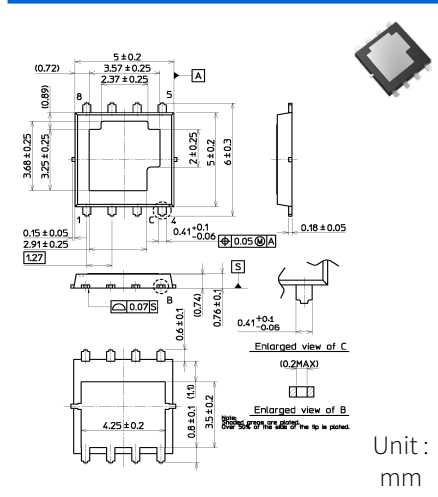
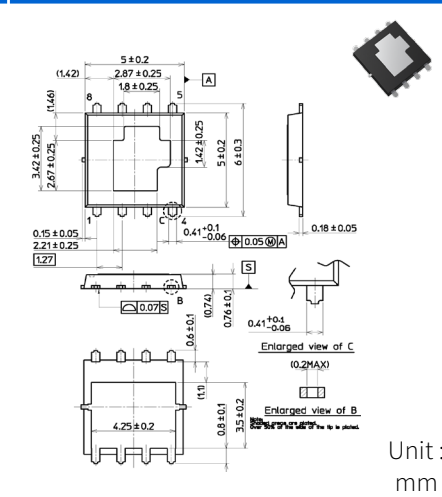
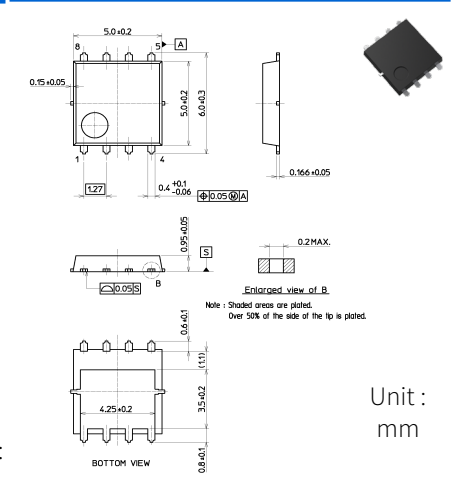
TSON Advance (WF) package (3.3mm x 3.6mm)

	Nch	UMOS8	40	XPN3R804NC	3.8	7.8@4.5V	40	100	35	✓
				XPN7R104NC	7.1	14.2@4.5V	20	65	21	✓
			60	XPN6R706NC	6.7	13.3@4.5V	40	100	35	✓
				XPN12006NC	12.0	23.7@4.5V	20	65	23	✓
			100	XPN1300ANC	13.3	24.2@4.5V	30	100	28	✓
	(XPN2400ANC)	(23.5)		(42.7@4.5V)	(20)	(65)	(20)	*		
	Pch	UMOS6	-40	XPN9R614MC	9.6	13.4@4.5V	-40	100	64	✓
				XPN19014MC	18.7	29.2@4.5V	-20	65	51	✓
			-60	(XPN27016MC)	(27.3)	(36.0@4.5V)	(-25)	(100)	(71)	*
				(XPN52016MC)	(52)	(66@4.5V)	(-15)	(65)	(47)	*

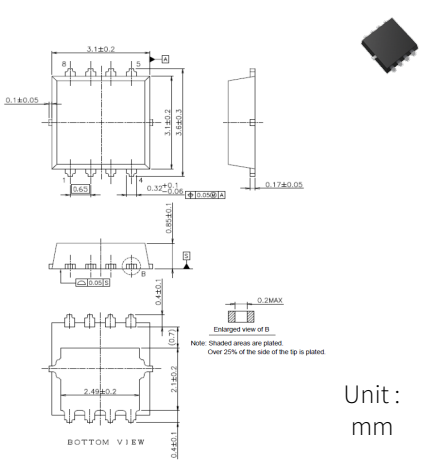
* Under development

Power MOSFET package line-up

L-TOGL™	S-TOGL™	DPAK+
 <p>Unit : mm</p>	 <p>Unit : mm</p>	 <p>Unit : mm</p>

DSOP Advance(WF) L with wettable flanks	DSOP Advance(WF) M with wettable flanks	SOP Advance(WF) with wettable flanks
 <p>Unit : mm</p>	 <p>Unit : mm</p>	 <p>Unit : mm</p>

TSON Advance(WF) with wettable flanks



Unit : mm

Double-sided cooling Package

The DSOP advance(WF) double-sided cooling packages fit the same footprint as the SOP advance(WF). Due to the greatly reduced thermal resistance, the maximum load can be increased considerably. Alternatively the MOSFET temperature can be reduced to increase long term reliability.

