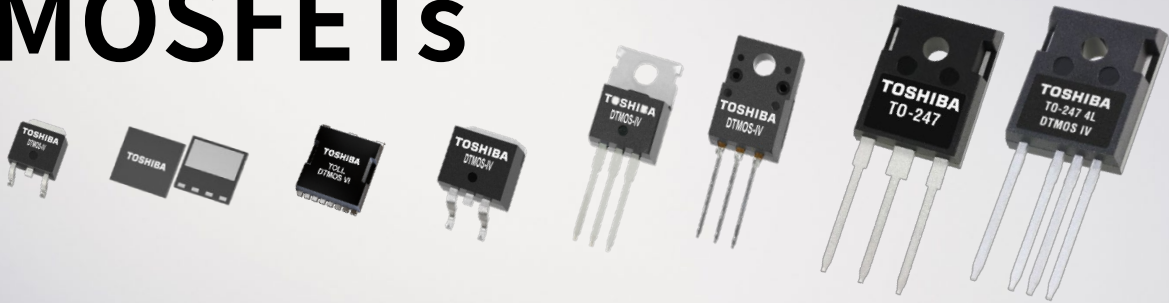


High Voltage MOSFETs



Latest Superjunction Technology

Toshiba has developed generations of superjunction 500V, 600V, 650V and 800V DTMOS IV and V MOSFET series, using the state-of-the-art single epitaxial process. Besides standard MOSFETs, Toshiba's DTMOS IV offers the fast-switching X-type and fast body-diode W5-type versions are also available. The DTMOS V series provides an even better EMI performance. Finally, the new DTMOS VI series is designed for highest efficiency switching and an item including an ultra-fast body diode (HSD) has been added to the line-up.

Applications

- Switched Mode Power Supply
- Lighting
- Power Factor Control
- Industrial applications (including UPS)

Features	Advantages	Benefits
<ul style="list-style-type: none"> • DTMOS IV: 30% reduction in $R_{DS(ON)} \cdot A$ • Application of latest process technology: single epitaxial process • Lowest FOM ($R_{DS(ON)} \times Q_{gd}$) offered by DTMOS VI • DTMOS VI with high-speed diodes (HSD) 	<ul style="list-style-type: none"> • Reduction of chip size at same performance or improved performance at same chip size • Lower increase in on-resistance at temperature rise because of single epitaxial process at DTMOS IV • DTMOS VI for highest efficiency level at power supply market • DTMOS VI (HSD) for resonant power supply topology 	<ul style="list-style-type: none"> • Less heat system and passive component costs • Reduced BOM costs due to most effective solutions • Excellent quality due to long term production experience • Easy design-in for faster time to market and product launch • Allows higher power density

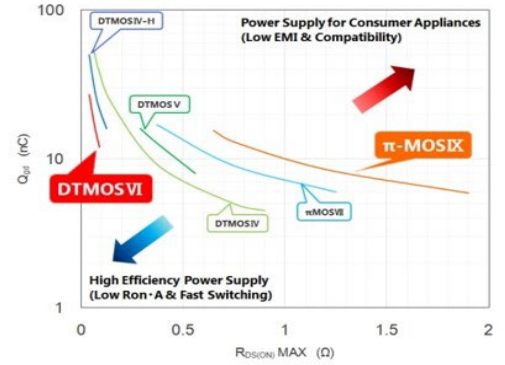
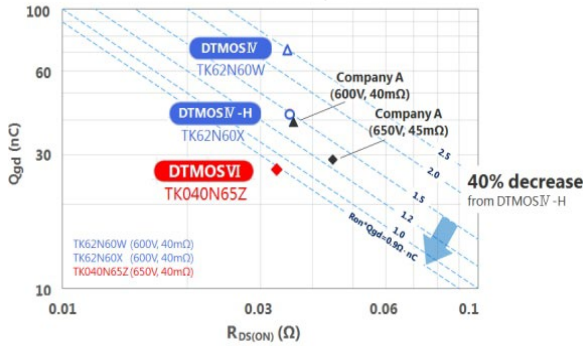
DTMOS - series	Applications
DTMOS VI Z/Z1-Series: Lowest FOM ($R_{DS(ON)} \times Q_{gd}$) NEW	Data Center, PV-Inverter, UPS
DTMOS VI Z5-Series: High speed MOSFET & body diode NEW	Data Center, PV-Inverter, UPS, Motor drive
DTMOS V Y-Series: Low EMI series	For lighting, battery charger and AC/DC adapter
DTMOS IV W-Series: Standard type	For general switching
DTMOS IV W5-Series: With high speed body diode	For bridge circuitry, like UPS or server SMPS
DTMOS IV X-Series: High speed type	For PFC circuit
DTMOS IV X5-Series: High speed MOSFET & body diode	For bridge circuitry, like UPS or server SMPS

DTMOS VI: For highest efficiency switching

Offering the lowest figure of merit $R_{DS(ON)} \times Q_{gd}$ in Toshiba's line-up, DTMOS VI is recommended for high-efficiency switching, supported by packages with a Kelvin Source: DFN 8 x 8, TO-247 4L and the powerful TOLL.

The avalanche tolerance I_{AS} of DTMOS VI is higher compared to other fast-switching superjunction MOSFETs in a similar $R_{DS(ON)}$ resistance range. There are new options with an intrinsic high-speed diode available to address resonant applications.

Comparisons of figures of merit



DTMOS VI 650V & 600V -series (lowest $R_{DS(ON)} \times Q_{gd}$) & “Z5” -series (with high speed diode)

	DFN 8x8mm	TO-220	TO-220SIS	TO-247	TO-247-4L	TOLL
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Outline



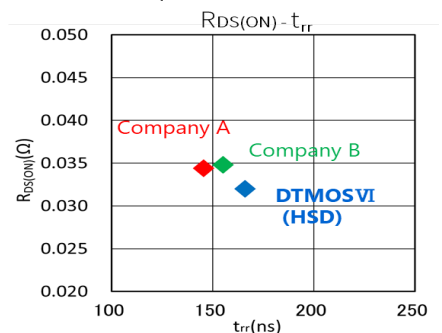
0.190Ω	TK210V65Z (0.21Ω)	TK190E65Z	TK190A65Z			TK190U65Z
0.155Ω	TK170V65Z (0.17Ω)	TK155E65Z	TK155A65Z / TK155A60Z1*			TK155U65Z
	NEW TK165V60Z1* (0.165Ω)			NEW		TK155U60Z1* NEW
0.110Ω	TK125V65Z (0.125Ω)	TK110E65Z	TK110A65Z	TK110N65Z	TK110Z65Z	TK110U65Z
	NEW TK130V60Z1* (0.13Ω)					TK125U60Z1* NEW
0.125Ω			TK125A60Z1* NEW	TK125N60Z1* NEW		
0.115Ω	NEW TK115V65Z5**	TK115E65Z5** NEW	TK115A65Z5** NEW	TK115N65Z5** NEW		
0.095Ω	NEW TK095V65Z5**	TK095E65Z5** NEW	TK095A65Z5** NEW	TK095N65Z5** NEW		
0.090Ω	TK099V65Z (0.099Ω)	TK090E65Z	TK090A65Z	TK090N65Z	TK090Z65Z	TK090U65Z
0.080Ω	NEW TK085V60Z1* (0.85Ω)		TK080A60Z1* NEW	TK080N60Z1* NEW		TK080U60Z1* NEW
0.068Ω				TK068N65Z5** NEW		
0.065Ω				TK065N65Z	TK065Z65Z	TK065U65Z
0.055Ω						TK055U60Z1* NEW
0.042Ω				TK042N65Z5** NEW		
0.04Ω				TK040N65Z	TK040Z65Z	

**650V with HSD; *600V

DTMOS VI 650V fast diode type “Z5” series **NEW**

Besides the excellent low figure of merit $R_{DS(ON)} \times Q_{gd}$, the DTMOS VI option with a fast body diode (“Z5”-suffix) offers a fast recovery time: e.g., t_{rr} =160ns (typ.) at 650V, 42mΩ item: TK042N65Z5. Additionally, the reverse current I_{DSS} @ 150°C, at high temperature was significantly reduced.

Comparison of 40mΩ class



DTMOS IV & V 600V standard “W” & “Y” series

	DPAK	IPAK	D2PAK	DFN 8x8mm	TO-220	TO-220SIS	TO-247
Outline							
0.75Ω	TK6P60W	TK6Q60W				TK6A60W	
0.60Ω	TK560P60Y* TK7P60W	TK7Q60W				TK560A60Y* TK7A60W	
0.50Ω	TK8P60W	TK8Q60W				TK8A60W	
0.38Ω	TK380P60Y* TK10P60W	TK10Q60W		TK10V60W	TK10E60W	TK380A60Y* TK10A60W	
0.30Ω	TK290P60Y* TK12P60W	TK12Q60W		TK12V60W	TK12E60W	TK290A60Y* TK12A60W	
0.19Ω			TK16G60W	TK16V60W	TK16E60W	TK16A60W	TK16N60W
0.155Ω			TK20G60W	TK20V60W	TK20E60W	TK20A60W	TK20N60W
88mΩ				TK31V60W	TK31E60W	TK31A60W	TK31N60W
65mΩ						TK39A60W	TK39N60W
40mΩ							TK62N60W

* DTMOS V

DTMOS IV 600V fast diode type “W5” series

	DPAK	D2PAK	DFN 8x8mm	TO-220	TO-220SIS	TO-247
0.65Ω	TK7P60W5				TK7A60W5	
0.54Ω	TK8P60W5				TK8A60W5	
0.45Ω					TK10A60W5	
0.23Ω		TK16G60W5	TK16V60W5	TK16E60W5	TK16A60W5	TK16N60W5
0.175Ω			TK20V60W5	TK20E60W5	TK20A60W5	TK20N60W5
99mΩ			TK31V60W5			TK31N60W5
74mΩ						TK39N60W5
45mΩ						TK62N60W5

DTMOS IV 600V high speed type (low Q_{gd}), fast diode type “X” & “X5” series

	DFN 8x8mm	TO-220	TO-220SIS	TO-247 4 L	TO-247
0.150Ω			TK22A65X***		
0.145Ω	TK25V60X5**	TK25E60X5**	TK25A60X5**		TK25N60X5**
0.125Ω	TK25V60X	TK25E60X	TK25A60X	TK25Z60X	TK25N60X
88mΩ	TK31V60X	TK31E60X		TK31Z60X	TK31N60X
65mΩ				TK39Z60X	TK39N60X
40mΩ				TK62Z60X	TK62N60X

* Samples available ** fast Diode ***650V-Type

DTMOS IV & V 650V standard “W” & “Y” series

	PAK	IPAK	D2PAK	DFN 8x8mm	TO-220	TO-220SIS	TO-247
Outline							
(1.0/1.05) Ω	TK6P65W	TK6Q65W				TK6A65W	
(0.78/0.8) Ω	TK7P65W	TK7Q65W				TK7A65W	
(0.65/0.67) Ω	TK8P65W	TK8Q65W				TK8A65W	
(0.5/0.56) Ω	TK560P65Y*	TK9Q65W				TK560A65Y*	
	TK9P65W					TK9A65W	
(0.39/0.44) Ω	TK380P65Y*	TK11Q65W				TK380A65Y*	
	TK11P65W					TK11A65W	
(0.25/0.29) Ω	TK290P65Y*		TK14G65W	TK14V65W	TK14E65W	TK290A65Y*	TK14N65W
						TK14A65W	
(0.20/0.21) Ω				TK17V65W	TK17E65W	TK17A65W	TK17N65W
(0.11/0.12) Ω				TK28V65W	TK28E65W	TK28A65W	TK28N65W
80m Ω						TK35A65W	TK35N65W
55m Ω							TK49N65W

* DTMOS V

DTMOS IV 650V high speed type (low Q_{gd}), fast diode type “W5” & “X5” series

	D2 PAK	DFN 8x8mm	TO-220	TO-220SIS	TO-247
Outline					
0.3 Ω	TK14G65W5		TK14E65W5	TK14A65W5	TK14N65W5
0.23 Ω				TK17A65W5	
(0.16/0.17) Ω		TK22V65X5*		TK22A65X5	
(0.13/0.14) Ω		TK28V65W5			TK28N65W5
95m Ω				TK35A65W5	TK35N65W5
57m Ω					TK49N65W5

* Fast diode + high speed type (low Q_{gd})

DTMOS IV 800V standard “W” series

	TO-220	TO-220SIS
Outline		
0.95 Ω	TK7E80W	TK7A80W
0.55 Ω	TK10E80W	TK10A80W
0.45 Ω	TK12E80W	TK12A80W
0.29 Ω	TK17E80W	TK17A80W

DTMOS IV 500V standard “W” series

	PAK	TO-220SIS
Outline		
0.38 Ω	TK10P50W	TK10A50W
0.30 Ω	TK12P50W	TK12A50W
0.19 Ω		TK19A50W