

MOSFETs Silicon N-Channel MOS (DTMOSVI)

TK073N60Z5

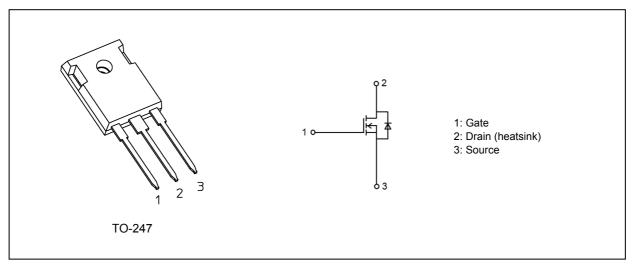
1. Applications

• Switching Voltage Regulators

2. Features

- (1) Fast reverse recovery time: $t_{rr} = 126$ ns (typ.)
- (2) Low drain-source on-resistance: $R_{DS(ON)} = 0.063 \Omega$ (typ.)
- (3) High-speed switching properties with the lower capacitance.
- (4) Enhancement mode: $V_{th} = 3.5 \text{ to } 4.5 \text{ V (V}_{DS} = 10 \text{ V, I}_{D} = 1.27 \text{ mA})$

3. Packaging and Internal Circuit



1



4. Absolute Maximum Ratings (Note) (Ta = 25 °C unless otherwise specified)

Characteristics	Symbol	Rating	Unit	
Drain-source voltage		V_{DSS}	600	V
Gate-source voltage	,	V _{GSS}	±30	
Drain current (DC)	(Note 1)	I _D	32	Α
Drain current (pulsed)	(Note 1)	I _{DP}	128	
Power dissipation (7	Γ _c = 25 °C)	P_{D}	230	W
Single-pulse avalanche energy	(Note 2)	E _{AS}	370	mJ
Single-pulse avalanche current		I _{AS}	5.4	Α
Reverse drain current (DC)	(Note 1)	I _{DR}	32	
Reverse drain current (pulsed)	(Note 1)	I _{DRP}	128	
Channel temperature		T _{ch}	150	°C
Storage temperature		T _{stg}	-55 to 150	
Mounting torque		TOR	0.8	N · m

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

5. Thermal Characteristics

Characteristics	Symbol	Max	Unit
Channel-to-case thermal resistance	R _{th(ch-c)}	0.543	°C/W
Channel-to-ambient thermal resistance	R _{th(ch-a)}	50	

Note 1: Ensure that the channel temperature does not exceed 150 °C.

Note 2: V_{DD} = 90 V, T_{ch} = 25 °C (initial), L = 22.5 mH, I_{AS} = 5.4 A

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.



6. Electrical Characteristics

6.1. Static Characteristics (T_a = 25 °C unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current	I _{GSS}	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	_	_	±1	μА
Drain cut-off current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V	_	_	100	
Drain-source breakdown voltage	V _{(BR)DSS}	I _D = 10 mA, V _{GS} = 0 V	600	_	_	V
Gate threshold voltage	V _{th}	V _{DS} = 10 V, I _D = 1.27 mA	3.5	_	4.5	
Drain-source on-resistance	R _{DS(ON)}	V _{GS} = 10 V, I _D = 11.2 A	1	0.063	0.073	Ω

6.2. Dynamic Characteristics (T_a = 25 °C unless otherwise specified)

Characteristics		Symbol	Test Condition	Min	Тур.	Max	Unit
Input capacitance		C _{iss}	V _{DS} = 300 V, V _{GS} = 0 V, f = 100 kHz	_	2860	_	pF
Reverse transfer capacitance		C _{rss}		_	2.9	_	
Output capacitance		C _{oss}		_	65	_	
Effective output capacitance (energy related)	(Note 3)	C _{o(er)}	V _{DS} = 0 to 400 V, V _{GS} = 0 V	_	106	_	
Effective output capacitance (time related)	(Note 4)	C _{o(tr)}		_	760	_	
Gate resistance		r _g	V _{DS} = OPEN , f = 1 MHz	_	2.8	_	Ω
Switching time (rise time)		t _r	See Fig. 6.2.1	_	47	_	ns
Switching time (turn-on time)		t _{on}		_	83	_	
Switching time (fall time)		t _f		_	4.3	_	
Switching time (turn-off time)		t _{off}		_	91	_	
MOSFET dv/dt ruggedness		dv/dt	$V_{DS} \le V_{DSS}, I_D \le 16 A$	110	_	_	V/ns

Note 3: $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 V to 400 V. Note 4: $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 V to 400 V.

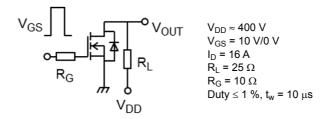


Fig. 6.2.1 Switching Time Test Circuit

6.3. Gate Charge Characteristics (T_a = 25 °C unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 32 \text{ A}$		50		nC
Gate-source charge 1	Q _{gs1}		_	18		
Gate-drain charge	Q_{gd}		_	17	_	



6.4. Source-Drain Characteristics (T_a = 25 °C unless otherwise specified)

Characteristics		Symbol	Test Condition	Min	Тур.	Max	Unit
Diode forward voltage		V_{DSF}	I _{DR} = 32 A, V _{GS} = 0 V	_	_	-1.7	V
Reverse recovery time	(Note 5)	t _{rr}	V _{DD} = 400 V,	_	126	202	ns
Reverse recovery charge		Q _{rr}	I _{DR} = 16 A, V _{GS} = 0 V -dI _{DR} /dt = 100 A/μs	_	0.69	_	μС
Peak reverse recovery current		Irr	-αιρκιαι – 100 Ανμδ	_	11	_	Α
Diode dv/dt ruggedness		dv/dt	$V_{DD} \le 400 \text{ V}, I_{DR} \le 16 \text{ A}, V_{GS} = 0 \text{ V}$	70	_	_	V/ns

Note 5: Defined by design.

7. Marking (Note)

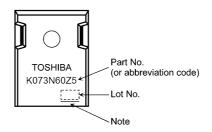


Fig. 7.1 Marking

Note: A line under a Lot No. identifies the indication of product Labels.

Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.



8. Characteristics Curves (Note)

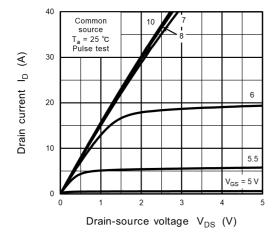


Fig. 8.1 I_D - V_{DS}

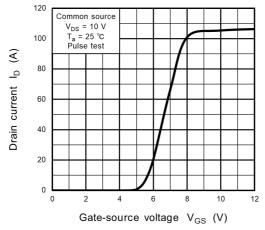


Fig. 8.3 I_D - V_{GS}

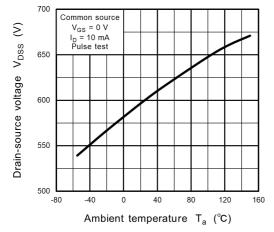


Fig. 8.5 V_{DSS} - T_a

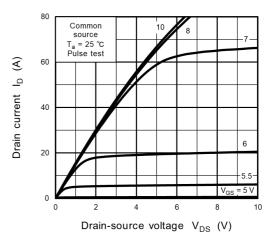


Fig. 8.2 I_D - V_{DS}

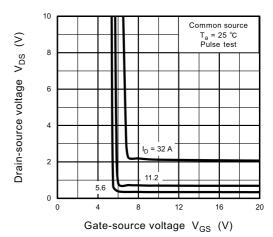


Fig. 8.4 V_{DS} - V_{GS}

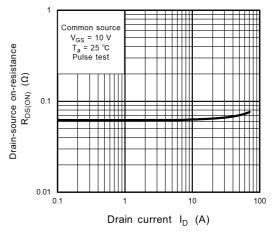
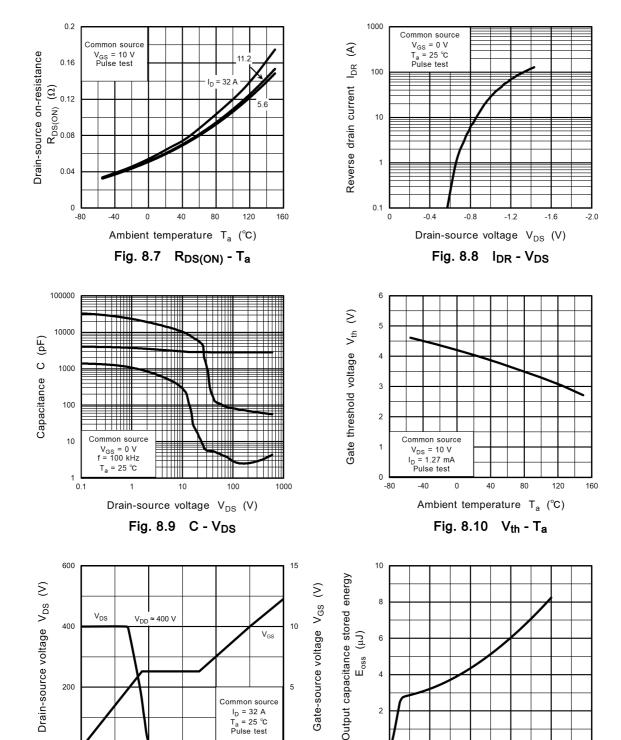


Fig. 8.6 R_{DS(ON)} - I_D





Total gate charge Q_q (nC) **Dynamic Input/Output Characteristics**

Common source I_D = 32 A T_a = 25 °C Pulse test

60

Drain-source voltage V_{DS} (V) Fig. 8.12 E_{OSS} - V_{DS}

200

0

0



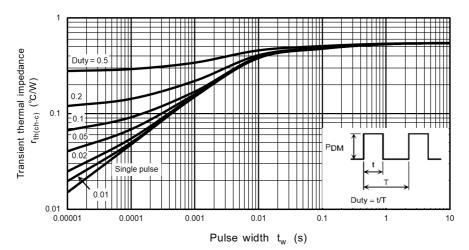


Fig. 8.13 r_{th} - t_w (Guaranteed Maximum)

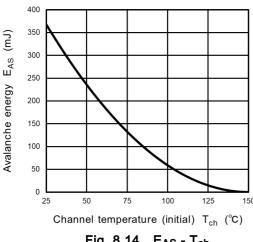
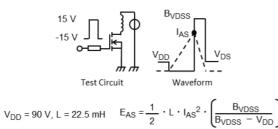
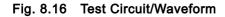


Fig. 8.14 E_{AS} - T_{ch} (Guaranteed Maximum)





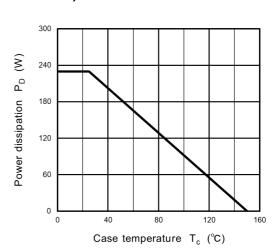


Fig. 8.15 P_D - T_c (Guaranteed Maximum)

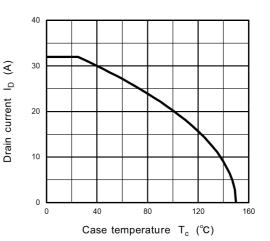


Fig. 8.17 $I_D - T_c$ (Guaranteed Maximum)



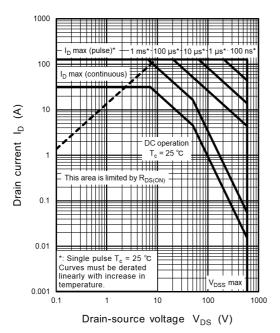


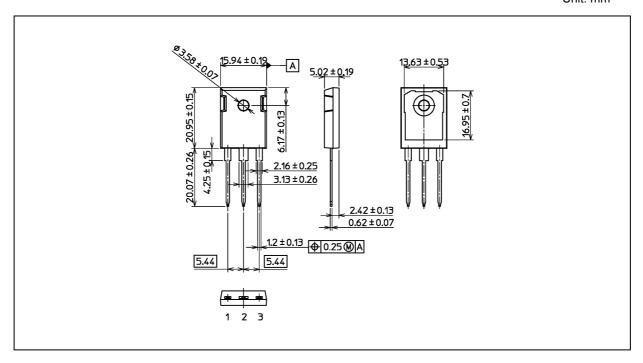
Fig. 8.18 Safe Operating Area (Guaranteed Maximum)

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



Package Dimensions

Unit: mm



Weight: 6.15 g (typ.)

Package Name(s)
TOSHIBA: 2-16L1A
Nickname: TO-247



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