TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (U-MOSVI-H)

ТРС8049-Н

Switching Regulator Applications Motor Drive Applications DC-DC Converter Applications

- Small footprint due to a small and thin package
- High-speed switching
- Small gate charge: Q_{SW} = 13 nC (typ.)
- Low drain-source ON-resistance:

 $R_{DS(ON)} = 6.9 \text{ m}\Omega \text{ (typ.)}$

- High forward transfer admittance: $|Y_{fs}| = 48 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \ \mu A \ (max) \ (V_{DS} = 60 \ V)$
- Enhancement mode: V_{th} = 1.3 to 2.3 V (V_{DS} = 10 V, I_D = 0.5 mA)

Absolute Maximum Ratings (Ta = 25°C)

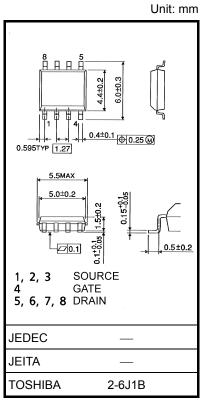
Characte	ristic	Symbol	Rating	Unit	
Drain-source voltage		V _{DSS}	60	V	
Drain-gate voltage (R	t _{GS} = 20 kΩ)	V _{DGR}	60	V	
Gate-source voltage		V _{GSS}	±20	V	
Drain current	DC (Note 1)	۱ _D	13	A	
Drain current	Pulsed (Note 1)	I _{DP}	52		
Drain power dissipati	on (t = 10 s) (Note 2a)	PD	1.9	W	
Drain power dissipati	on (t = 10 s) (Note 2b)	PD	1.0	W	
Single-pulse avalance	ne energy (Note 3)	E _{AS}	61	mJ	
Avalanche current		I _{AR}	13	А	
Repetitive avalanche (To	energy c = 25°C) (Note 4)	E _{AR}	0.06	mJ	
Channel temperature		T _{ch}	150	°C	
Storage temperature	range	T _{stg}	–55 to 150	°C	

Note: For Notes 1 to 4, refer to the next page.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in

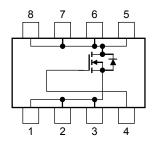
temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

This transistor is an electrostatic-sensitive device. Handle with care.



Weight: 0.085g (typ.)

Circuit Configuration

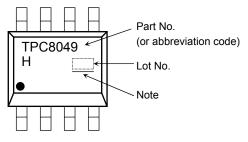


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Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to ambient $(t = 10 \ s)$ (Note 2a)	R _{th (ch-a)}	65.8	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	R _{th (ch-a)}	125	°C/W

Marking (Note 5)

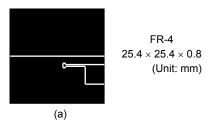


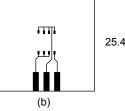
Note : A line under a Lot No. identifies the indication of product Labels [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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

Note 2: (a) Device mounted on a glass-epoxy board (a)

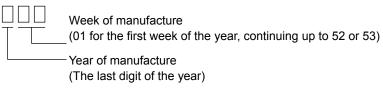




(b) Device mounted on a glass-epoxy board (b)

FR-4 25.4 × 25.4 × 0.8 (Unit: mm)

- Note 3: $V_{DD} = 24 \text{ V}, \text{ T}_{ch} = 25^{\circ}\text{C}$ (initial), L = 500 μ H, R_G = 25 Ω , I_{AR} = 13 A
- Note 4: Repetitive rating: pulse width limited by maximum channel temperature
- Note 5: * Weekly code: (Three digits)



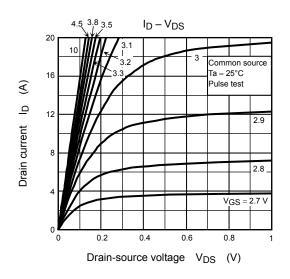
Electrical Characteristics (Ta = 25°C)

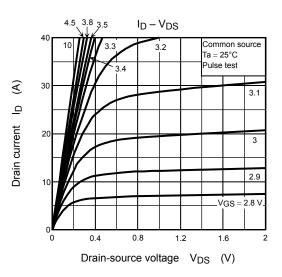
Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit	
Gate leakage cur	rent	I _{GSS}	$V_{GS}=\pm 20~V,~V_{DS}=0~V$			±100	nA	
Drain cutoff curre	ent	I _{DSS}	$V_{DS} = 60 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$	_		10	μA	
Drain agurag bra	Prain-source breakdown voltage		I _D = 10 mA, V _{GS} = 0 V	60	_	_	V	
Drain-source brea	akuown vollage	V (BR) DSX	$I_D = 10 \text{ mA}, V_{GS} = -20 \text{ V}$	45	_	_	v	
Gate threshold vo	oltage	V _{th}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 0.5 \text{ mA}$	1.3	1.3 — 2.3		V	
Drain-source ON	ragiotanaa	Pro (ou)	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 6.5 \text{ A}$	_	7.7	11.5		
Drain-source ON	-lesistance	R _{DS (ON)}	$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 6.5 \text{ A}$	6.9 10.7 24 48 3545 4610 130 190		10.7	mΩ	
Forward transfer	admittance	Y _{fs}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 6.5 \text{ A}$	24	48	_	S	
Input capacitance	9	C _{iss}		_	3545	4610		
Reverse transfer	capacitance	C _{rss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		130	190	pF	
Output capacitance		C _{oss}		_	420	_		
Gate resistance		rg	$V_{DS} = 10 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ f} = 1 \text{ MHz}$	_	1.0	1.5	Ω	
Switching time	Rise time	tr	$V_{GS} \stackrel{10}{}_{0}V \qquad I_{D} = 6.5 \text{ A}$	_	2.8		. ns	
	Turn-on time	t _{on}		_	12	_		
	Fall time	t _f			5.8			
	Turn-off time	t _{off}	$V_{DD}\approx 30~V$ Duty \leq 1%, $t_W=$ 10 μs	_	47	_		
Total gate charge	Total gate charge		$V_{DD}\approx 48~V,~V_{GS}=10~V,~I_{D}=13~A$	_	56	_		
(gate-source plus	s gate-drain)	Qg	$V_{DD}\approx 48~V,~V_{GS}=5~V,~I_{D}=13~A$	29 -		_		
Gate-source charge 1		Q _{gs1}	$V_{DD} \approx 48 \text{ V}, \text{ V}_{GS} = 10 \text{ V}, \text{ I}_{D} = 13 \text{ A}$	_	10	_	nC	
Gate-drain ("Miller") charge		Q _{gd}			8.1	_		
Gate switch char	ge	Q _{SW}	1	_	13	—		

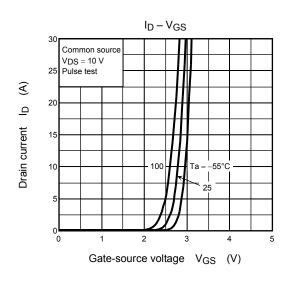
Source-Drain Ratings and Characteristics (Ta = 25°C)

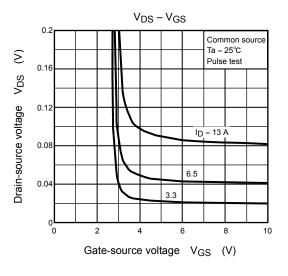
Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit	
Peak forward current	Pulse	(Note 1)	I _{FP}	—	_	_	52	А
Forward voltage (diode)			V _{DSF}	I _{DR} = 13 A, V _{GS} = 0 V	_		-1.2	V

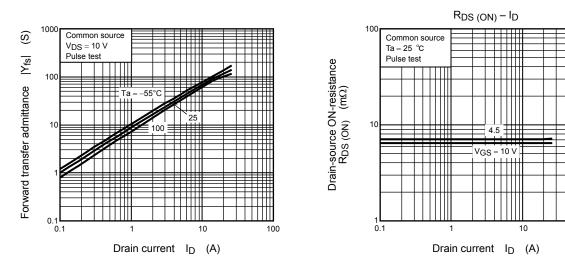
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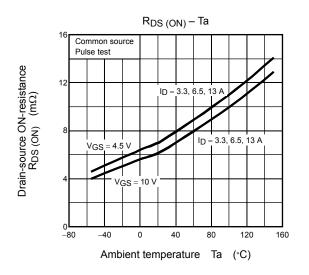


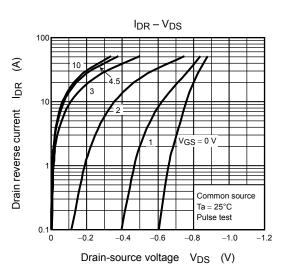


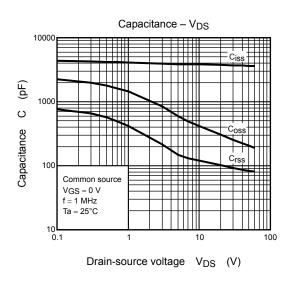


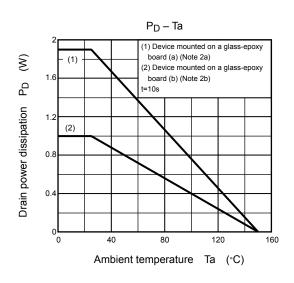


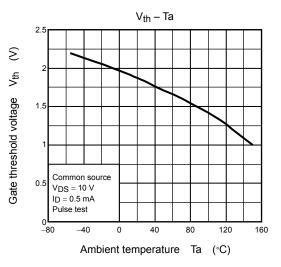
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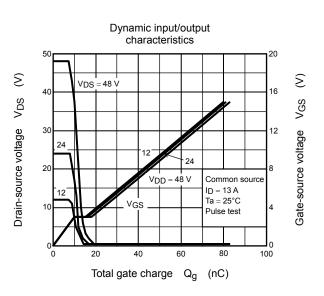


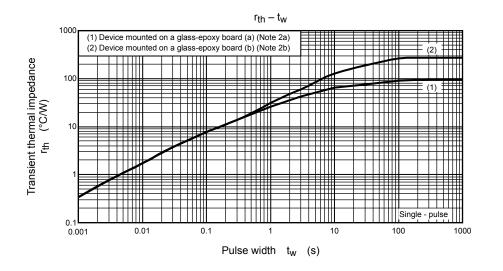


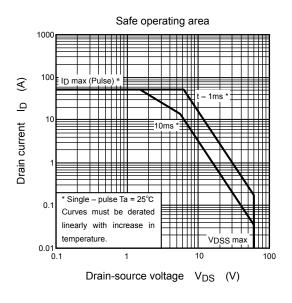












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