TOSHIBA Field Effect Transistor with Built-in Schottky Barrier Diode

Silicon N-Channel MOS Type (U-MOS V-H)

TPC8A05-H

High Efficiency DC-DC Converter Applications Notebook PC Applications Portable Equipment Applications

- Built-in schottky barrier diode
- Low forward voltage: V_{DSF} = 0.6 V (max)
- High-speed switching
- Small gate charge: Q_{SW} = 3.7 nC (typ.)
- Low drain-source ON-resistance: $RDS(ON) = 9.5 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 26 \text{ S} (typ.)$
- Low leakage current: $I_{DSS} = 100 \ \mu A \ (max) \ (V_{DS} = 30 \ V)$
- Enhancement mode: $V_{th} = 1.3$ to 2.3 V ($V_{DS} = 10$ V, $I_D = 1$ mA)

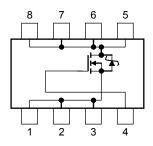
Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V _{DSS}	30	//
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		VDGR	30	V
Gate-source voltage		V _{GSS})) ±20	v
Drain current	DC (Note 1)	tD	10	A
Drain current	Pulsed (Note 1)	IDP	40	
Drain power dissipation (t = 10 s) (Note 2a)		PD	1.9	W
Drain power dissipation (t = 10 s) (Note 2b)		PD (1.0	w
Single-pulse avalanche energy (Note 3)		EAS	65	mJ
Avalanche current		I _{AR}	10	А
Repetitive avalanche energy (Tc=25°C) (Note 4)		EAR	0.10	mJ
Channel temperature		Tch	150	°C
Storage temperature range		T _{stg}	–55 to 150	°C

Unit: mm Unit:

Weight: 0.085g (typ.)

Circuit Configuration



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

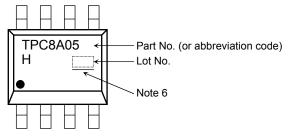
reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

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

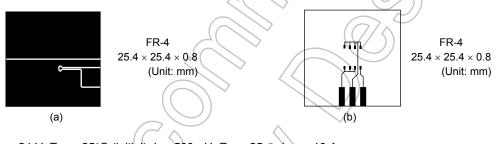
Thermal Characteristics

Characteristic	Symbol	Max	Unit
$\label{eq:transform} \begin{array}{l} \mbox{Thermal resistance, channel to ambient} \\ \mbox{(t = 10 s)} & (\mbox{Note 2a}) \end{array}$	R _{th (ch-a)}	65.8	°C/W
$\label{eq:transform} \begin{array}{l} \mbox{Thermal resistance, channel to ambient} \\ \mbox{(t = 10 s)} & (\mbox{Note 2b}) \end{array}$	R _{th (ch-a)}	125	°C/W

Marking (Note 5)

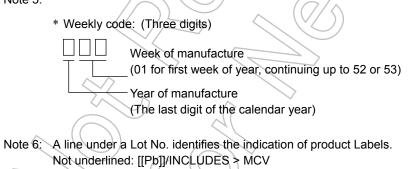


- Note 1: Ensure that the channel temperature does not exceed 150°C.
- Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



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} = 10 A

Note 4: Repetitive rating: pulse width limited by maximum channel temperature Note 5:



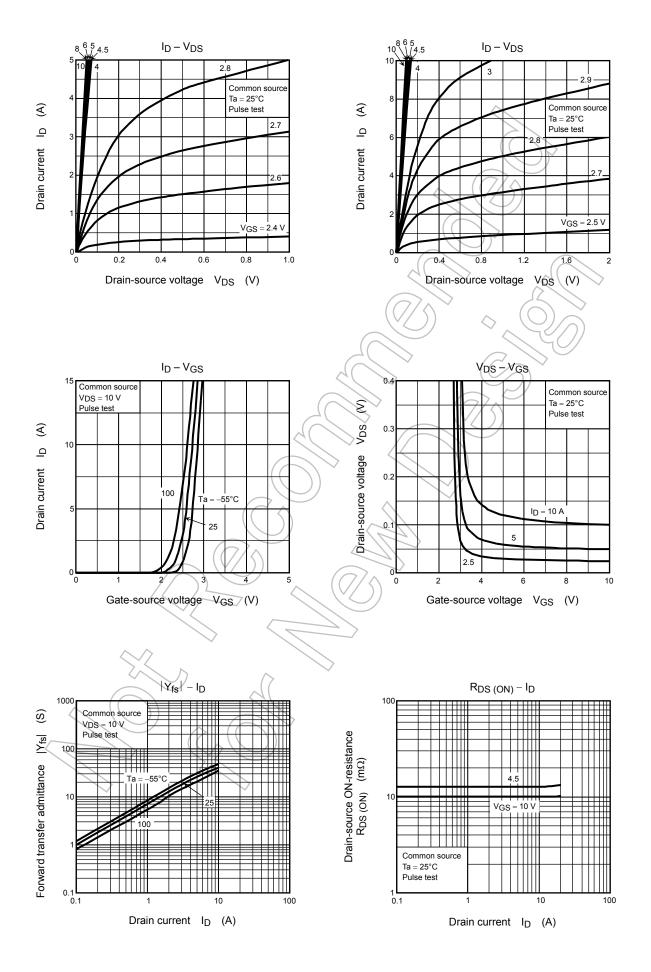
Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]] Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction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

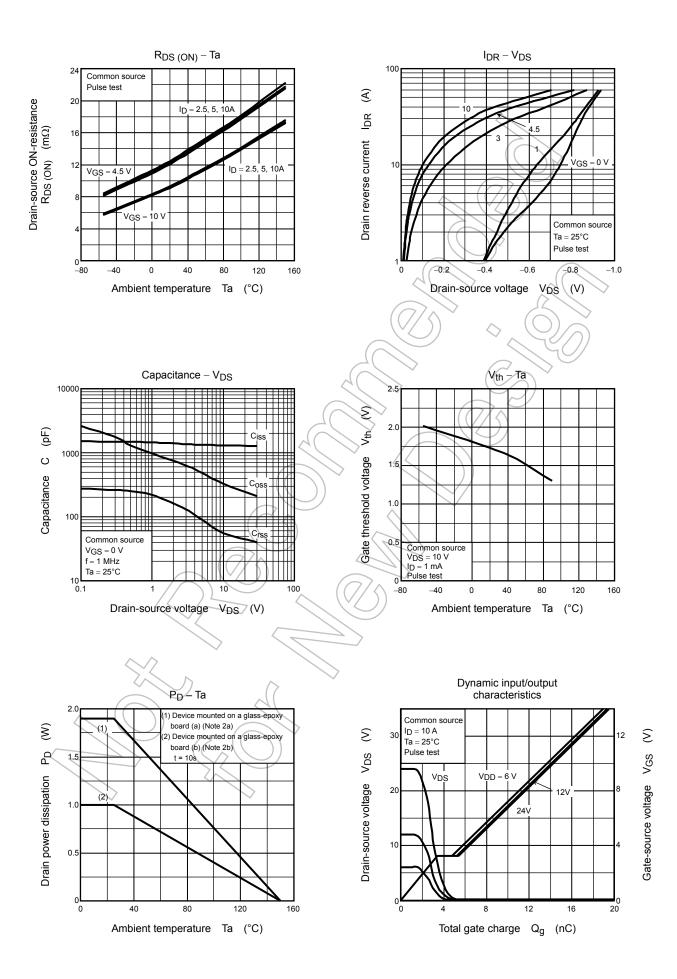
Electrical Characteristics (Ta = 25°C)

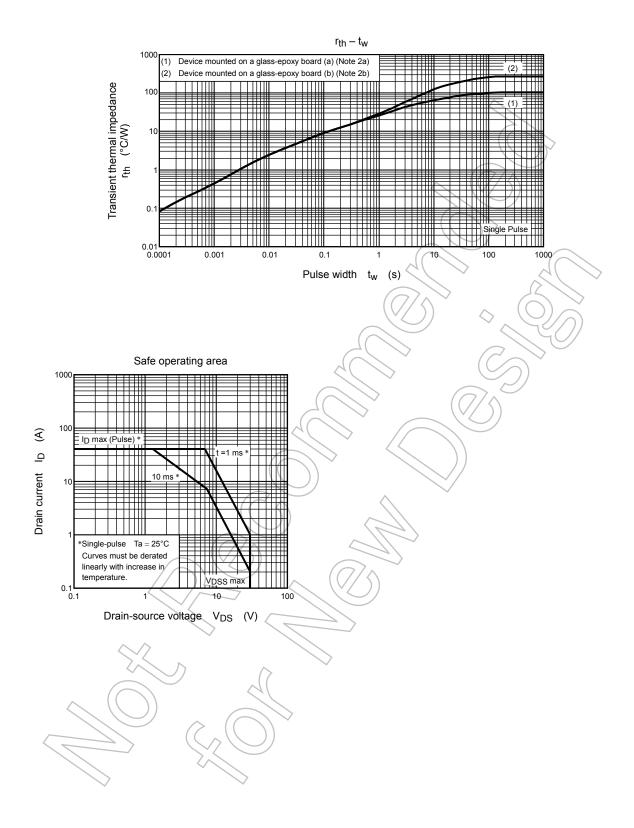
Ch	aracteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage cur	rent	I _{GSS}	$V_{GS}=\pm 20~V,~V_{DS}=0~V$	_	—	±100	nA
Drain cutoff curre	ent	I _{DSS}	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$	_	_	100	μA
Drain-source breakdown voltage		V (BR) DSS	$I_{\rm D} = 10$ mA, $V_{\rm GS} = 0$ V 30		_	_	V
		V (BR) DSX	$I_D = 10 \text{ mA}, V_{GS} = -20 \text{ V}$	15	1	_	v
Gate threshold vo	oltage	V _{th}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 1 \text{ mA}$	1.3)/(2.3	V
Drain-source ON-resistance		R _{DS (ON)}	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 5 \text{ A}$	77	12.6	17.6	m ()
			V _{GS} = 10 V, I _D = 5 A	Ĥ	9.5	13.3	mΩ
Forward transfer	admittance	Y _{fs}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 5 \text{ A}$	13	26	_	S
Input capacitance		C _{iss}		<u> </u>	1300	1700	
Reverse transfer capacitance		C _{rss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		55	80	pF
Output capacitance		C _{oss}		_	330	\searrow	
Gate resistance		rg	$V_{DS} = 10 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ f} = 5 \text{ MHz}$	-(1.8	2.7	Ω
Switching time	Rise time	tr	10 V D ID = 5 A	X	2,0) _	
	Turn-on time	t _{on}			7.1	_	ns
	Fall time	t _f			2.5	_	
	Turn-off time	toff	V _{DD} ≈ 15 V Duty ≤ 1%, t _w = 10 μs	_	18	_	
Total gate charge (gate-source plus gate-drain)		Qg	$V_{DD} \approx 24 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$		15	_	
			$V_{DD} \approx 24 \text{ V}, V_{GS} = 5 \text{ V}, I_D \neq 10 \text{ A}$	_	7.4	_	
Gate-source char	rge 1	Q _{gs1}		_	3.6	_	nC
Gate-drain ("Miller") charge		Qgd	$V_{DD} \approx 24 \text{ V}, \text{ V}_{GS} = 10 \text{ V}, \text{ I}_{D} = 10 \text{ A}$	_	2.0	_	
Gate switch charge		QSW		_	3.7	_	

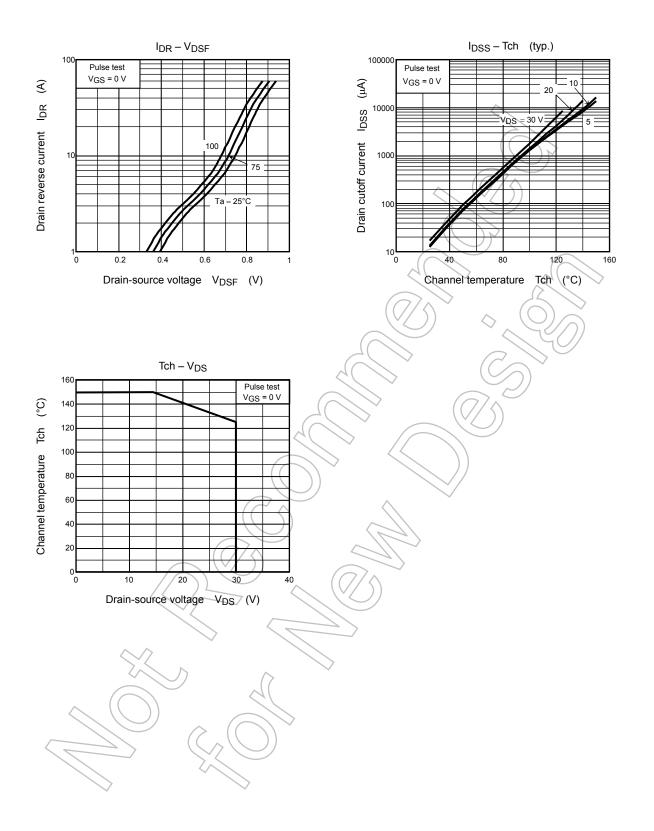
Source-Drain Ratings and Characteristics ($Ta = 25^{\circ}C$)

Characteristic Symbol		Test Condition	Min	Тур.	Max	Unit
Peak forward current Pulse (Note 1)	I _{FP}	> -	_	_	40	А
Forward voltage (diode)	VDSF	I _{DR} = 1 A, V _{GS} = 0 V	_	-0.4	-0.6	V
		$I_{DR} = 10 \text{ A}, \text{ V}_{GS} = 0 \text{ V}$	_		-1.2	V









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