

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOS III)

TPCA8102

Lithium Ion Battery Applications
 Notebook PC Applications
 Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 4.5\text{m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 60\text{S}$ (typ.)
- Low leakage current: $I_{DSS} = -10\ \mu\text{A}$ (max) ($V_{DS} = -30\ \text{V}$)
- Enhancement mode: $V_{th} = -0.8$ to $-2.0\ \text{V}$ ($V_{DS} = -10\ \text{V}$, $I_D = -1\ \text{mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

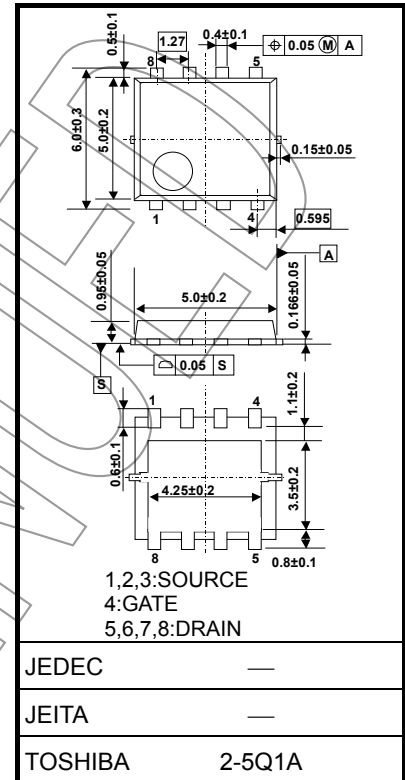
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	-30	V
Drain-gate voltage ($R_{GS} = 20\ \text{k}\Omega$)	V_{DGR}	-30	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	-40
	Pulsed (Note 1)	I_{DP}	-120
Drain power dissipation ($T_c=25^\circ\text{C}$)	P_D	45	W
Drain power dissipation ($t = 10\ \text{s}$) (Note 2a)	P_D	2.8	W
Drain power dissipation ($t = 10\ \text{s}$) (Note 2b)	P_D	1.6	W
Single pulse avalanche energy (Note 3)	E_{AS}	208	mJ
Avalanche current	I_{AR}	-40	A
Repetitive avalanche energy ($T_c=25^\circ\text{C}$) (Note 4)	E_{AR}	4.5	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

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).

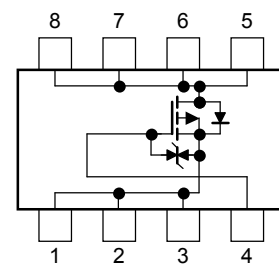
This transistor is an electrostatic-sensitive device.
 Please handle with caution.

Unit: mm



Weight: 0.076 g (typ.)

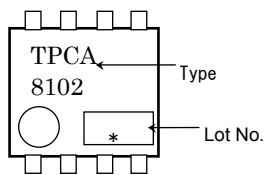
Circuit Configuration



Thermal Characteristics

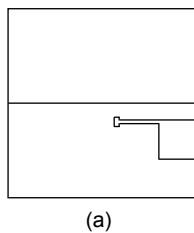
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c=25^\circ\text{C}$)	$R_{th(ch-c)}$	2.78	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a)	$R_{th(ch-a)}$	44.6	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2b)	$R_{th(ch-a)}$	78.1	$^\circ\text{C/W}$

Marking (Note 5)

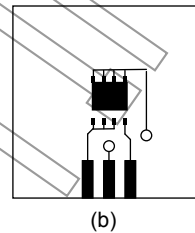


Note 1: Ensure that the channel temperature does not exceed 150°C .

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



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



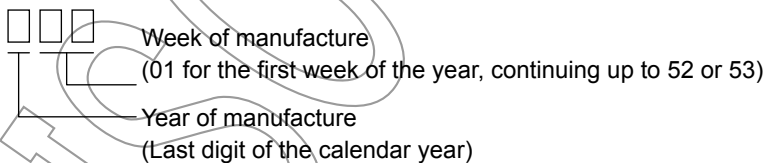
FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 100\ \mu\text{H}$, $R_G = 25\ \Omega$, $I_{AR} = -40\text{ A}$

Note 4: Repetitive rating: pulse width limited by max channel temperature

Note 5: "O" on the lower left of the marking indicates Pin 1.

* Weekly code (three digits):

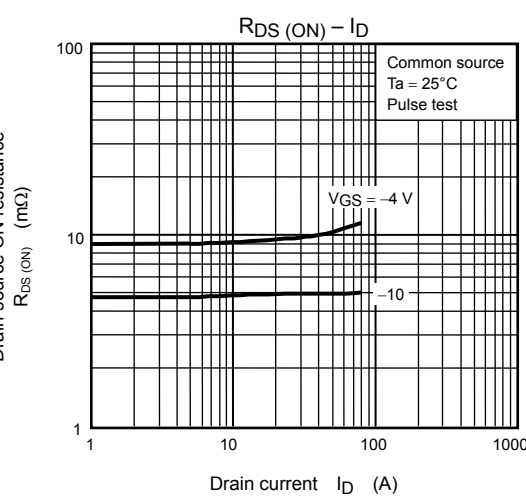
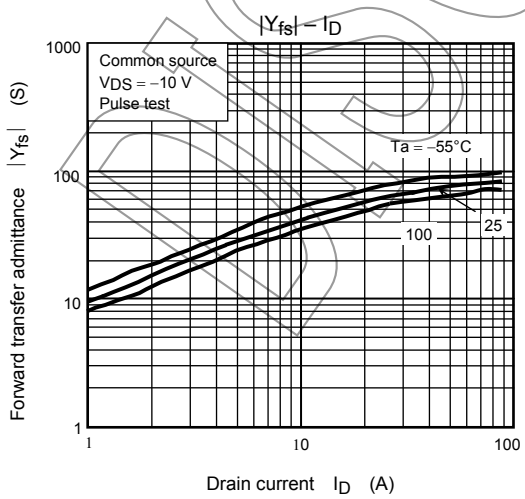
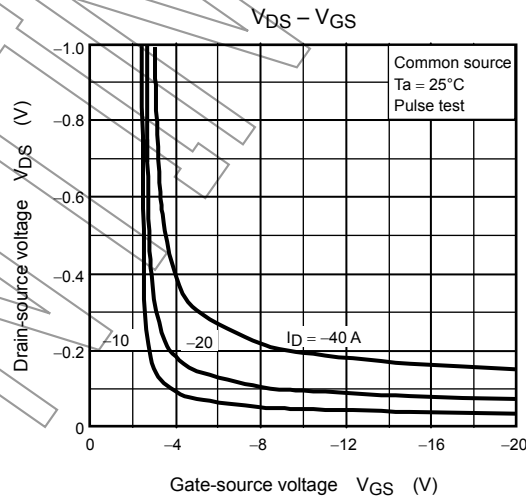
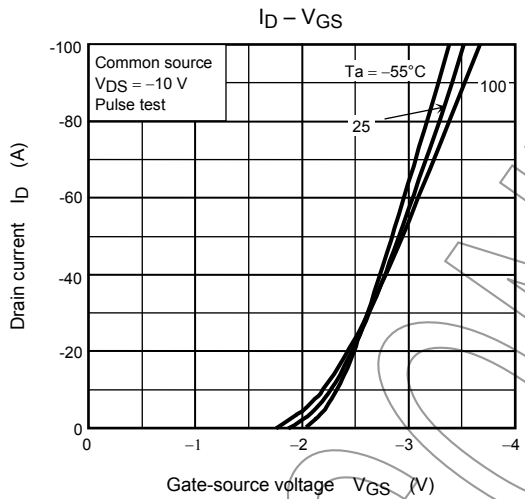
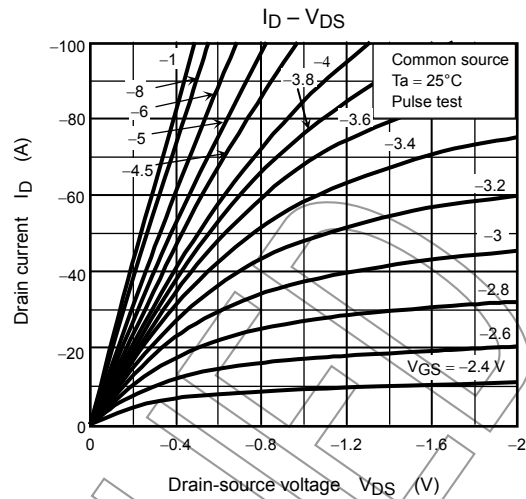
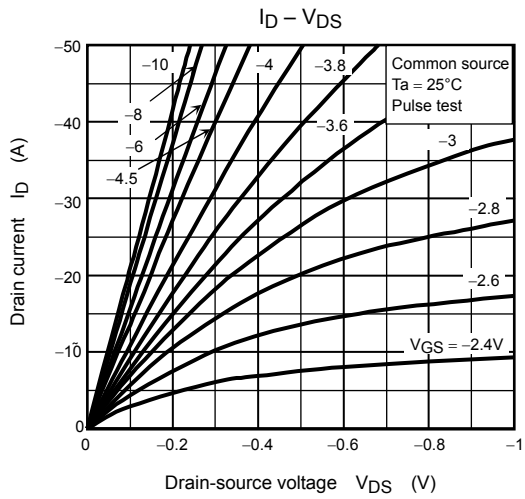


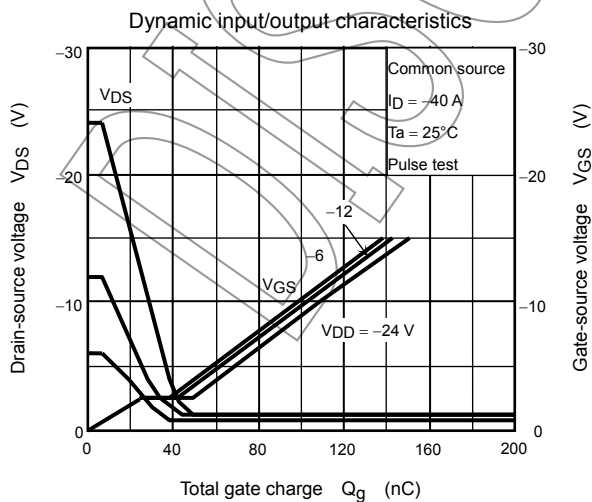
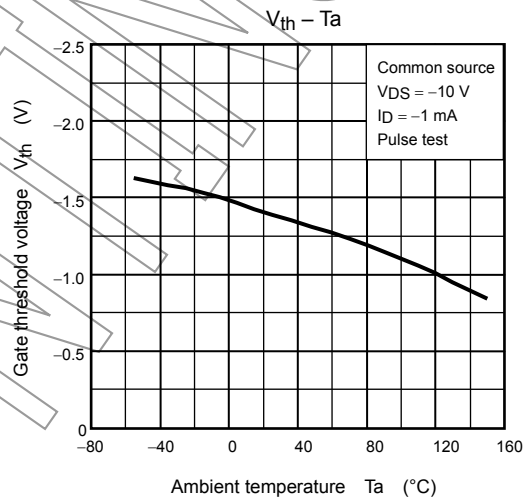
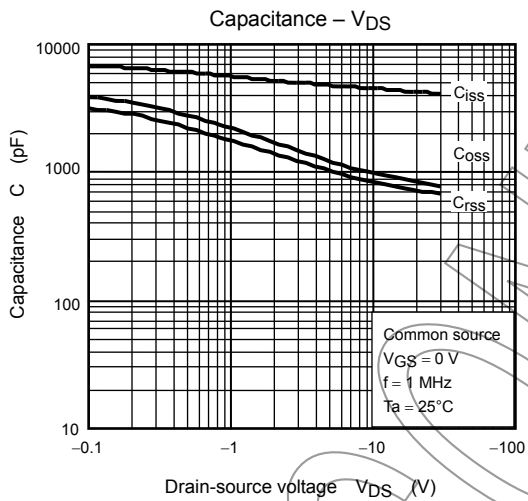
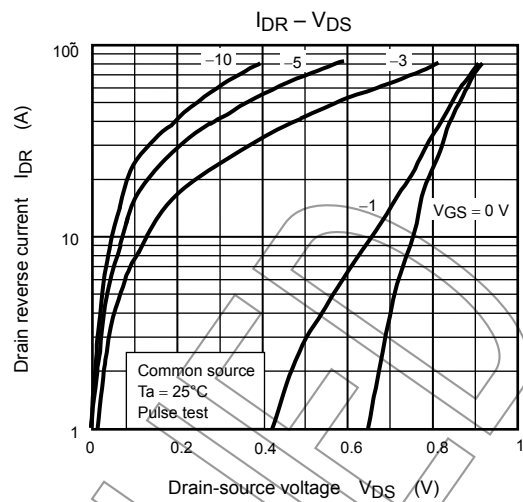
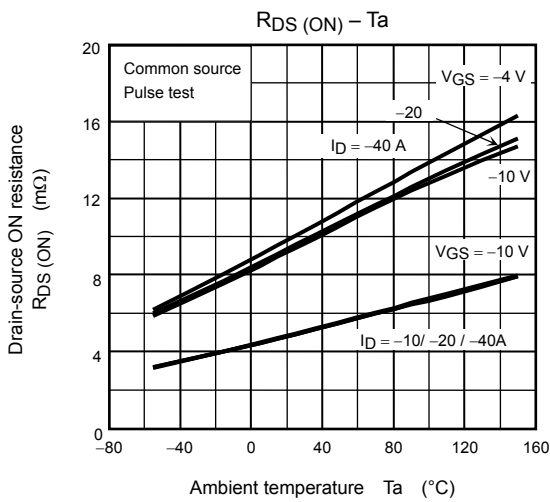
Electrical Characteristics (Ta = 25°C)

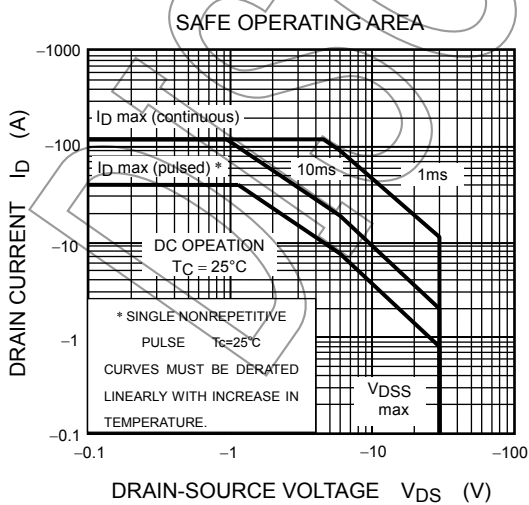
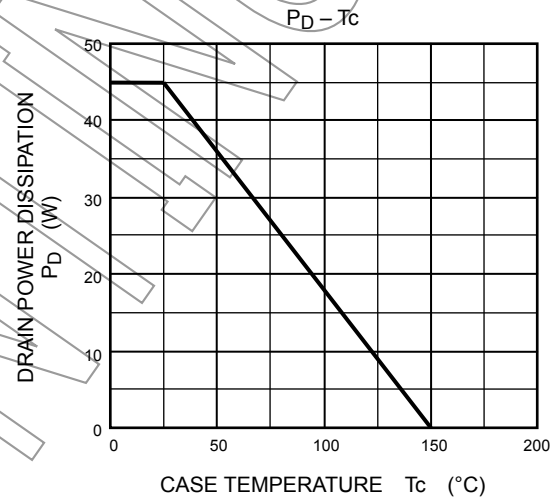
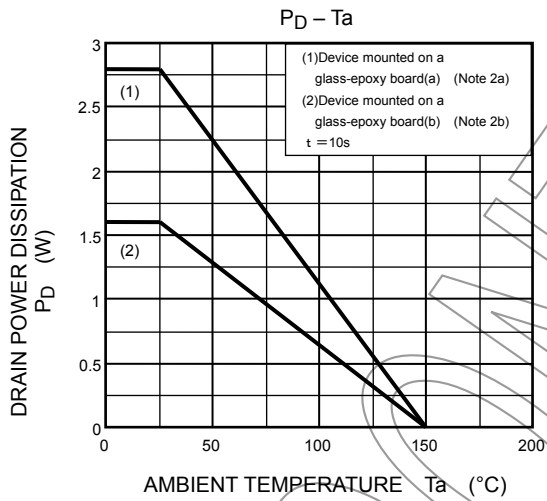
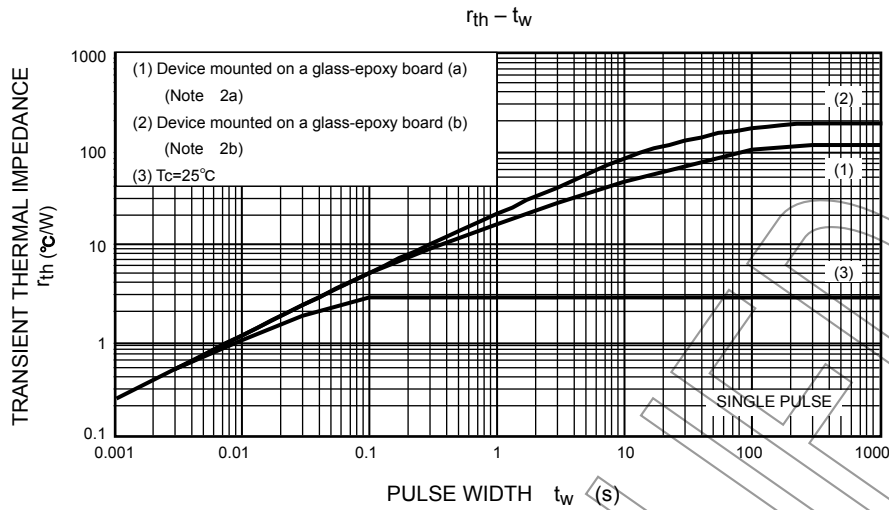
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cut-OFF current		I_{DSS}	$V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-30	—	—	V
		$V_{(BR)DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 20 \text{ V}$	-15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4 \text{ V}, I_D = -20 \text{ A}$	—	9.0	14	$\text{m}\Omega$
			$V_{GS} = -10 \text{ V}, I_D = -20 \text{ A}$	—	4.5	6.0	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -20 \text{ A}$	30	60	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	4600	—	pF
Reverse transfer capacitance		C_{rss}		—	850	—	
Output capacitance		C_{oss}		—	980	—	
Switching time	Rise time	t_r		—	10	—	ns
	Turn-ON time	t_{on}		—	20	—	
	Fall time	t_f		—	78	—	
	Turn-OFF time	t_{off}		Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$	—	220	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -24 \text{ V}, V_{GS} = 10 \text{ V}, I_D = -40 \text{ A}$	—	109	—	nC
Gate-source charge 1		Q_{gs1}		—	24	—	
Gate-drain ("miller") charge		Q_{gd}		—	25	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-120	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -40 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V







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