

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

TPCS8303

Lithium Ion Battery Applications
 Notebook PC Applications
 Portable Machines and Tools

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 15 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 18 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -20 \text{ V}$)
- Enhancement mode: $V_{th} = -0.45 \sim -1.2 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -200 \text{ }\mu\text{A}$)

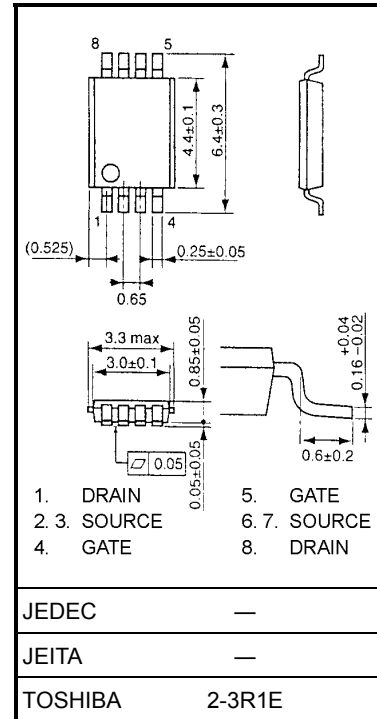
Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	-5	A
	Pulse (Note 1)	I_{DP}	-20	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$P_D(1)$	1.1	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.75	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$P_D(1)$	0.6	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.35	
Single pulse avalanche energy (Note 4)		E_{AS}	16.3	mJ
Avalanche current		I_{AR}	-5	A
Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3b, 5)		E_{AR}	0.075	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$

Note 1, Note 2, Note 3, Note 4, Note 5: See the next page.

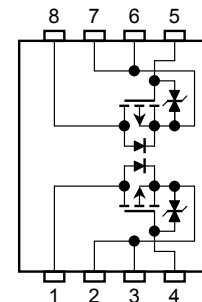
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

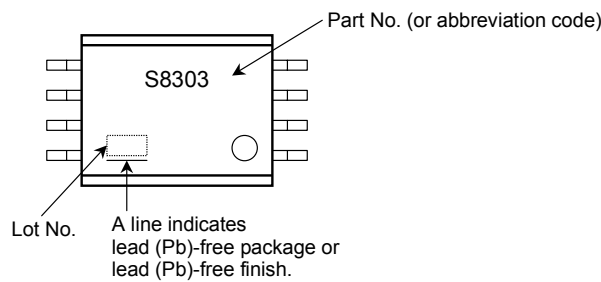
Circuit Configuration



Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	114	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	167	
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	208	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	357	

Marking (Note 6)

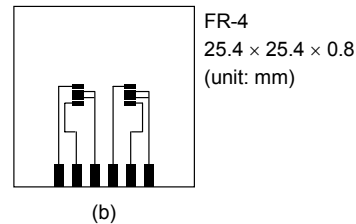
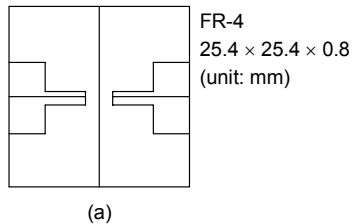


Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2:

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

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



Note 3:

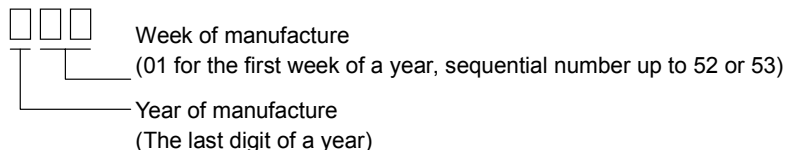
- a) The power dissipation and thermal resistance values are shown for a single device (During single-device operation, power is only applied to one device.)
- b) The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both devices.)

Note 4: $V_{DD} = -16\text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 500\ \mu\text{H}$, $I_{AR} = -5\text{A}$, $R_G = 25\ \Omega$

Note 5: Repetitive rating: pulse width limited by max channel temperature

Note 6: ○ on lower right of the marking indicates Pin 1.

※ Weekly code: (Three digits)

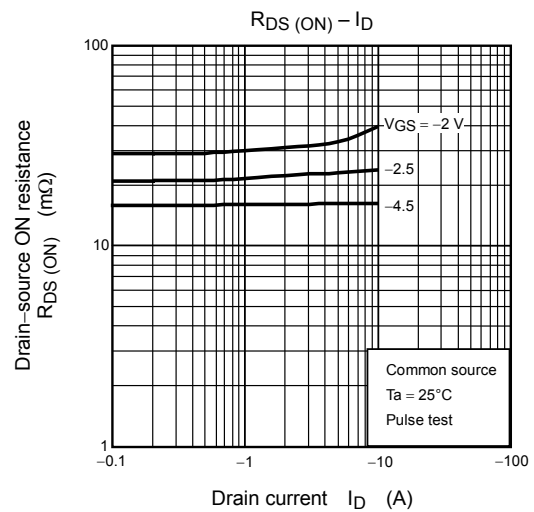
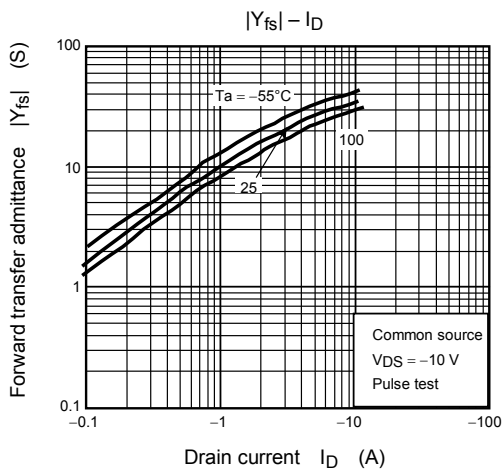
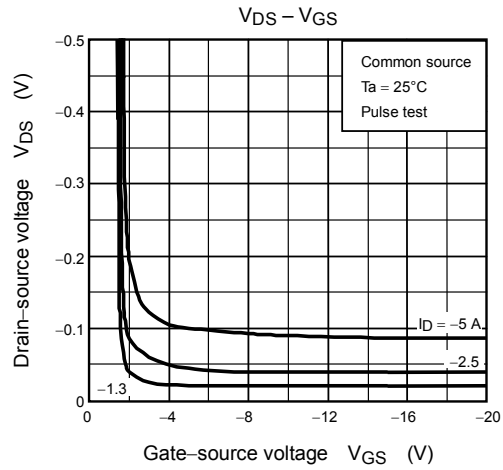
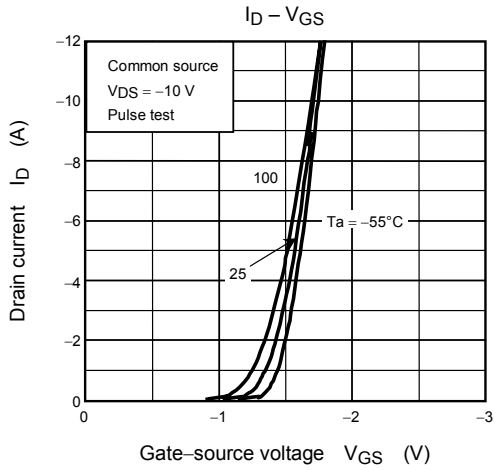
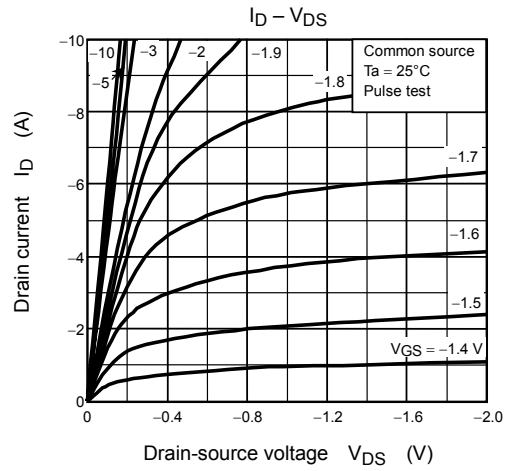
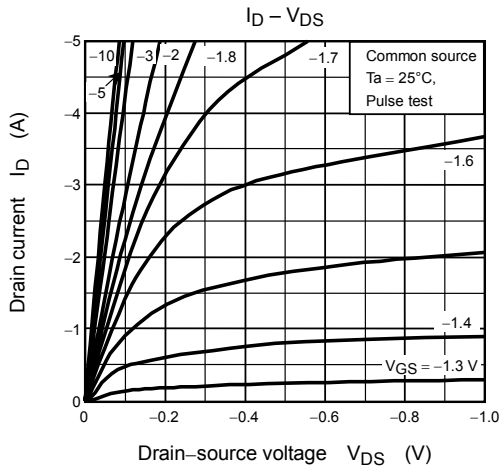


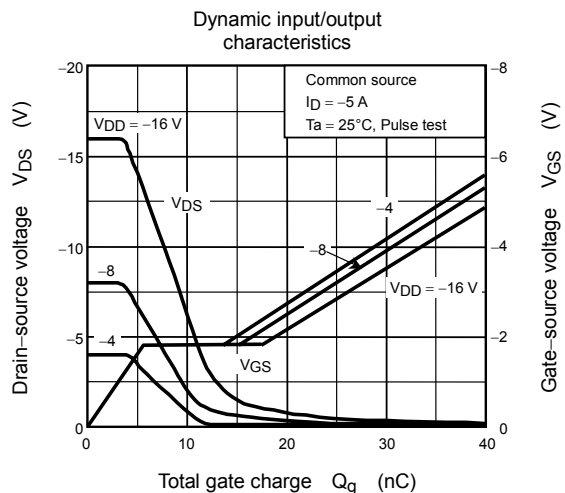
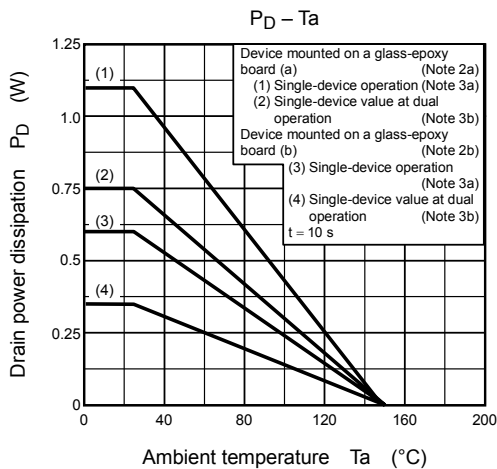
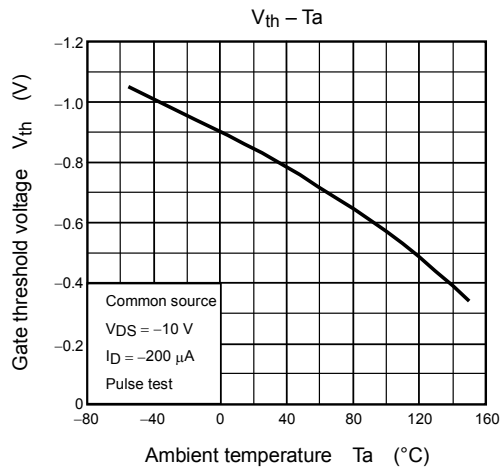
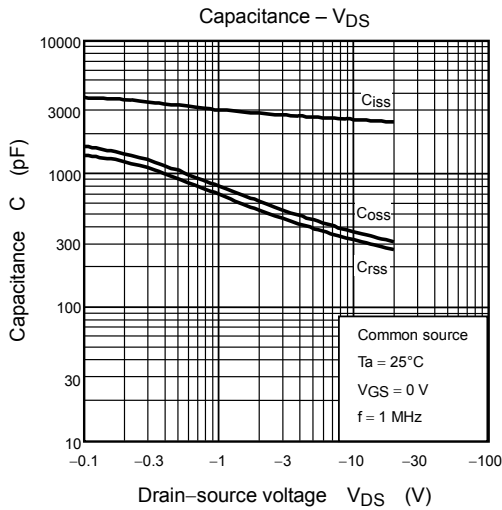
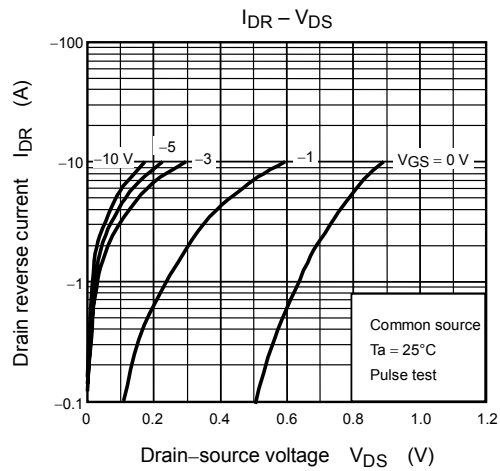
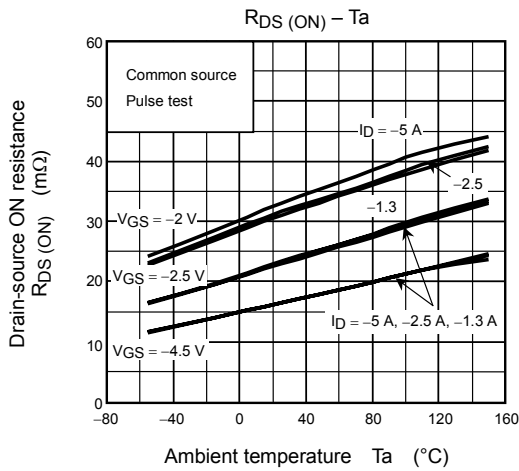
Electrical Characteristics (Ta = 25°C)

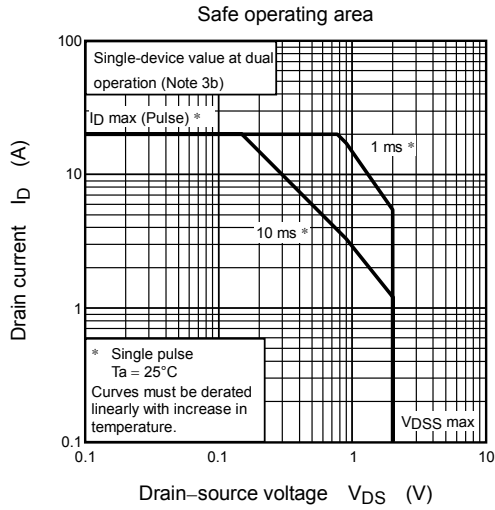
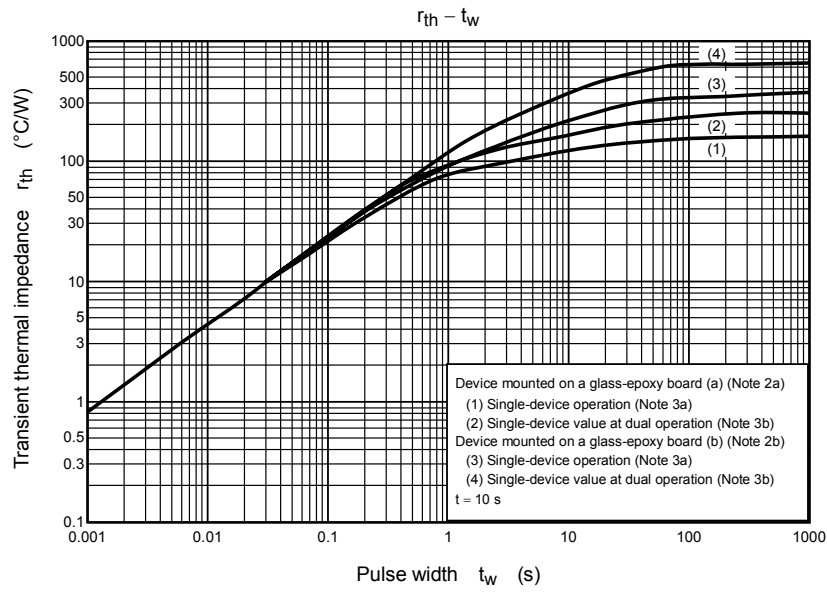
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-OFF current		I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-20	—	—	V
		$V_{(BR)DSX}$	$I_D = -10\text{ mA}, V_{GS} = 12\text{ V}$	-8	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -200\text{ }\mu\text{A}$	-0.45	—	-1.2	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -2.0\text{ V}, I_D = -2.5\text{ A}$	—	31	80	m Ω
			$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$	—	22	30	
			$V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$	—	15	21	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	9	18	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	2560	—	pF
Reverse transfer capacitance		C_{rss}		—	330	—	
Output capacitance		C_{oss}		—	380	—	
Switching time	Rise time	t_r		—	5	—	ns
	Turn-ON time	t_{on}		—	14	—	
	Fall time	t_f		—	42	—	
	Turn-OFF time	t_{off}		—	142	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16\text{ V}, V_{GS} = -5\text{ V}, I_D = -5\text{ A}$	—	33	—	nC
Gate-source charge 1		Q_{gs}		—	10	—	
Gate-drain ("miller") charge		Q_{gd}		—	5.4	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-20	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V







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