

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

TPCP8303

Lithium Ion Battery Applications
 Notebook PC Applications
 Portable Equipment Applications

- Low drain-source ON-resistance: $R_{DS(ON)} = 41 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 12 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -20 \text{ V}$)
- Enhancement mode: $V_{th} = -0.3 \text{ to } -1.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

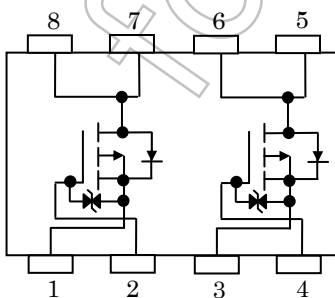
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 8	V
Drain current	DC (Note 1)	I_D	-3.8	A
	Pulse (Note 1)	I_{DP}	-15.2	
Drain power dissipation (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	P_D (1)	1.48	W
	Single-device value at dual operation (Note 3b)	P_D (2)	1.23	
Drain power dissipation (t = 5 s) (Note 2b)	Single-device operation (Note 3a)	P_D (1)	0.58	W
	Single-device value at dual operation (Note 3b)	P_D (2)	0.36	
Single-pulse avalanche energy (Note 4)		E_{AS}	18.8	mJ
Avalanche current		I_{AR}	-3.8	A
Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3b, 5)		E_{AR}	0.04	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C

Note: For Notes 1 to 6, see the next page.

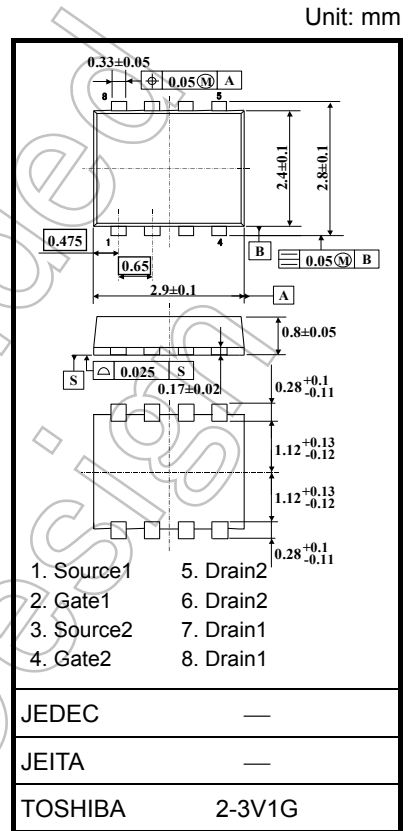
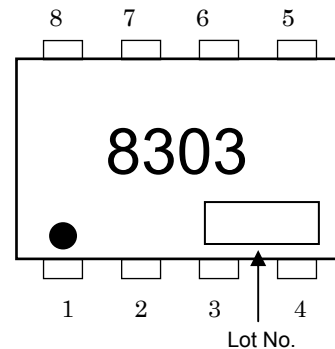
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within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

Circuit Configuration



Marking (Note 6)



Weight: 0.017 g (typ.)

Start of commercial production
 2009-05

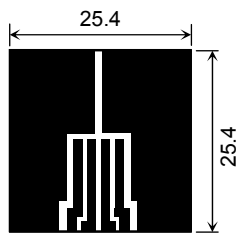
Thermal Characteristics

Characteristic		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	R _{th} (ch-a) (1)	84.5	°C/W
	Single-device value at dual operation (Note 3b)	R _{th} (ch-a) (2)	101.6	
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	Single-device operation (Note 3a)	R _{th} (ch-a) (1)	215.5	°C/W
	Single-device value at dual operation (Note 3b)	R _{th} (ch-a) (2)	347.2	

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

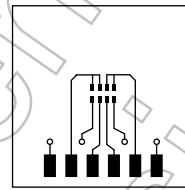
Note 2: (a) Device mounted on a glass-epoxy board (a)

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



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: a) The power dissipation and thermal resistance values shown are for a single device. (During single-device operation, power is applied to one device only.)

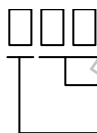
b) The power dissipation and thermal resistance values shown are for a single device. (During dual operation, power is applied to both devices evenly.)

Note 4: V_{DD} = -16 V, T_{ch} = 25°C (initial), L = 1 mH, R_G = 1 Ω, I_{AR} = -3.8 A

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

Note 6: ● on the lower left of the marking indicates Pin 1.

* Weekly code (three digits):



Week of manufacture

(01 for the first week of the year, continuing up to 52 or 53)

Year of manufacture

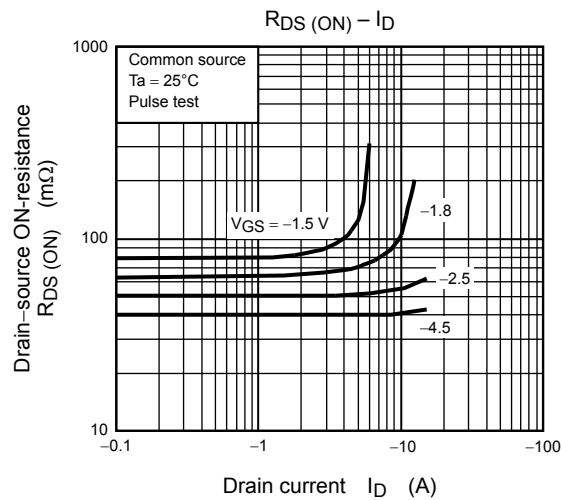
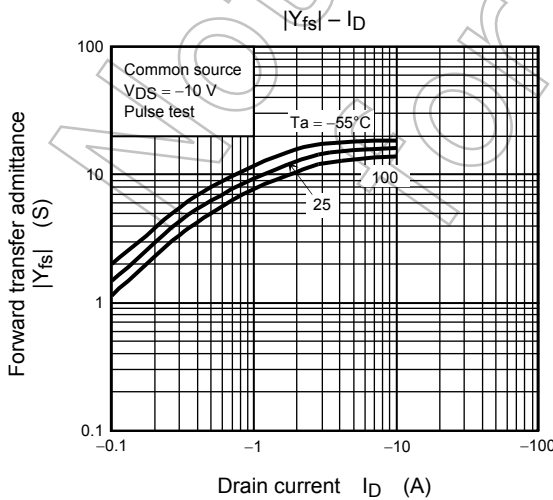
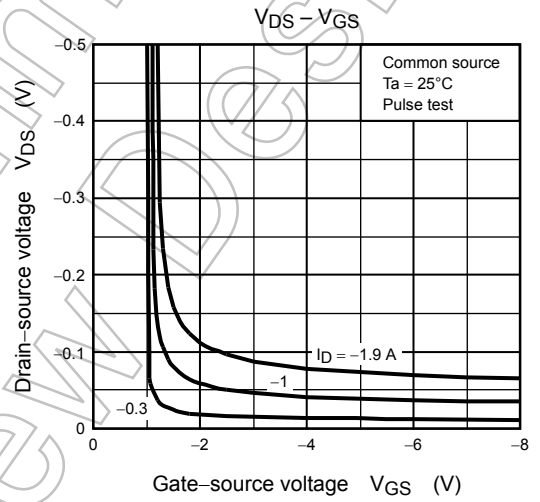
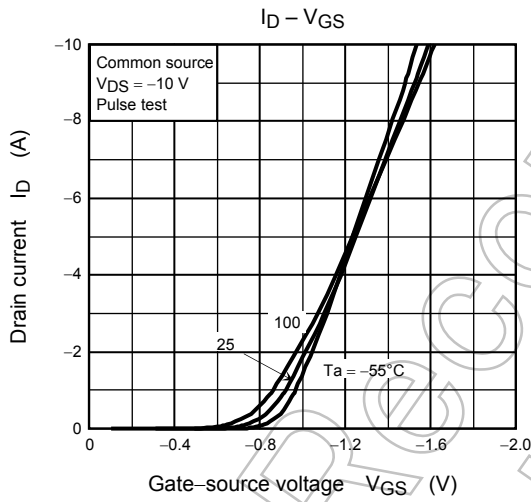
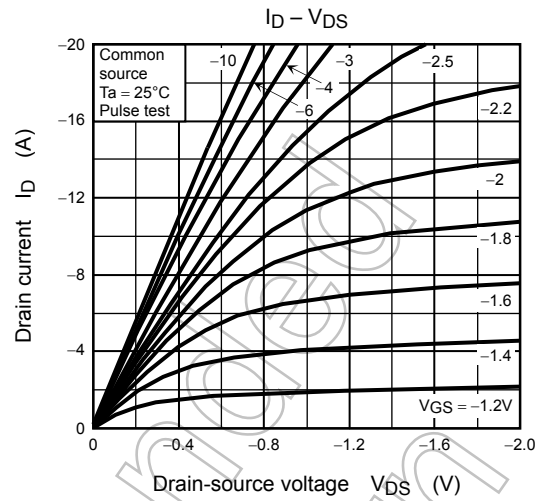
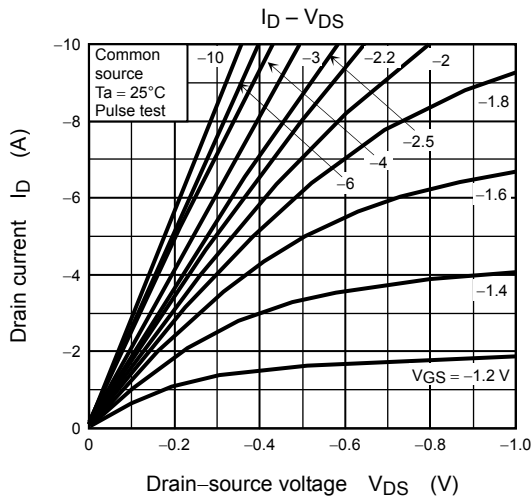
(The last digit of the year)

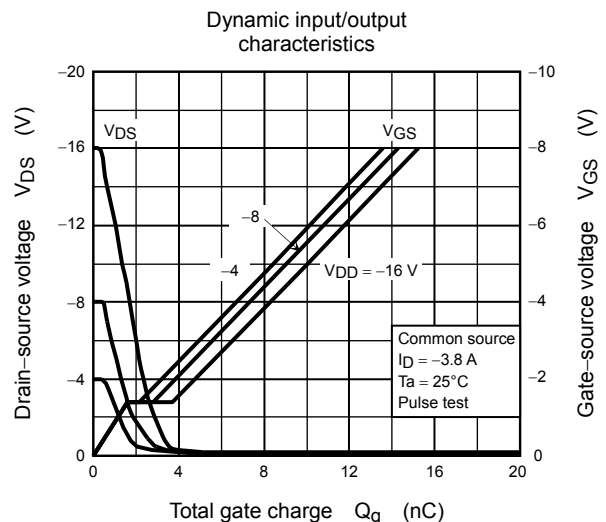
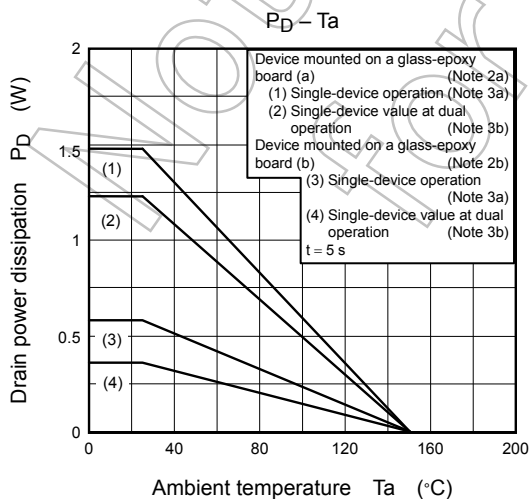
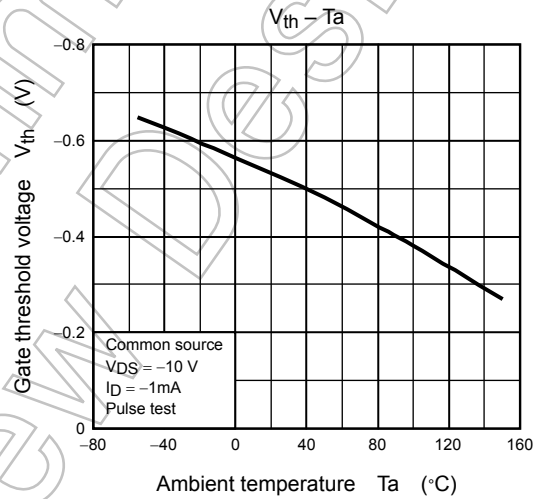
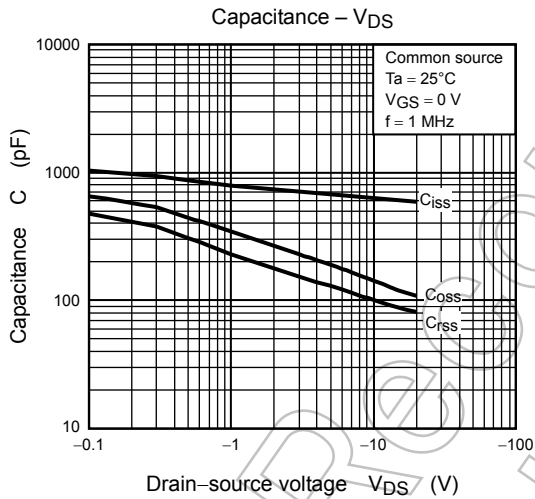
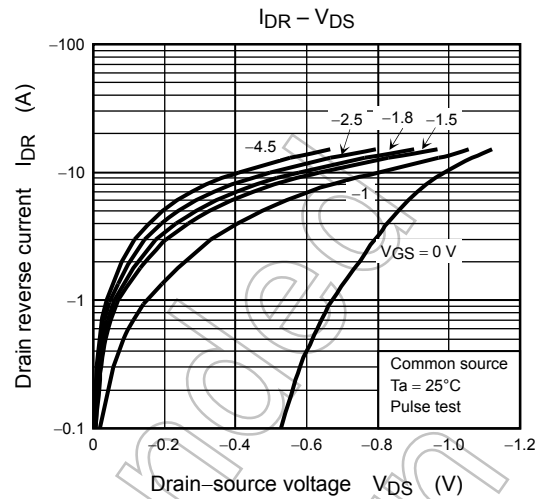
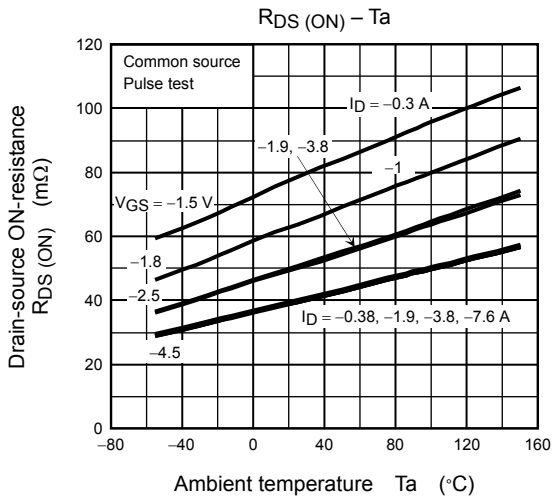
Electrical Characteristics (Ta = 25°C)

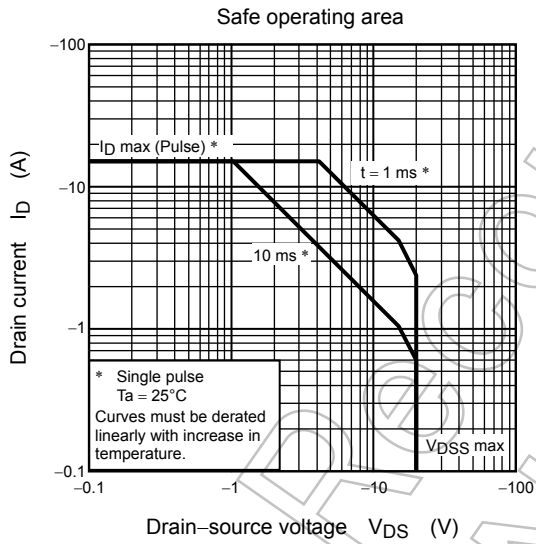
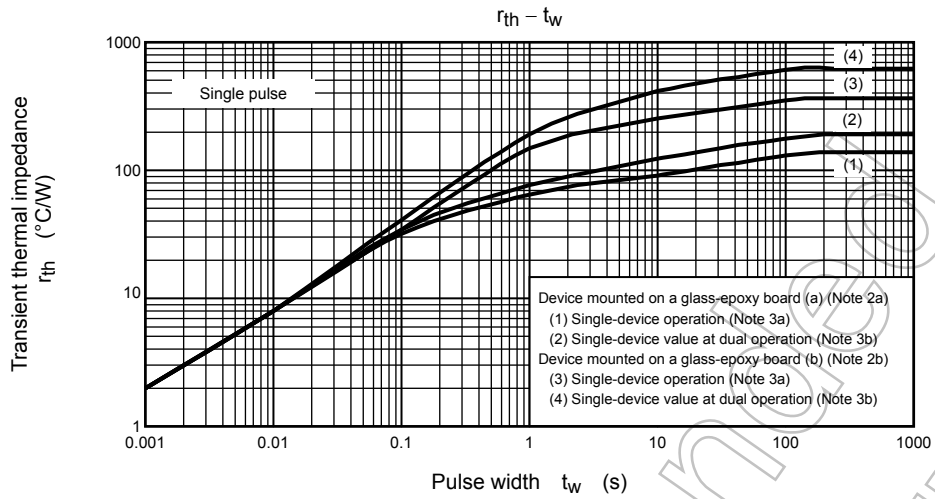
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current		I_{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 1	μA	
Drain cutoff current		I_{DSS}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA	
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-20	—	—	V	
		$V_{(BR)DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 8 \text{ V}$	-12	—	—		
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-0.3	—	-1.0	V	
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = -1.5 \text{ V}, I_D = -0.3 \text{ A}$	—	85	144	m Ω	
		$R_{DS(ON)}$	$V_{GS} = -1.8 \text{ V}, I_D = -1.0 \text{ A}$	—	66	90		
		$R_{DS(ON)}$	$V_{GS} = -2.5 \text{ V}, I_D = -1.9 \text{ A}$	—	52	60		
		$R_{DS(ON)}$	$V_{GS} = -4.5 \text{ V}, I_D = -1.9 \text{ A}$	—	41	46		
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -1.9 \text{ A}$	6	12	—	S	
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	640	—	pF	
Reverse transfer capacitance		C_{rss}		—	100	—		
Output capacitance		C_{oss}		—	140	—		
Switching time	Rise time	t_r		—	12	—	ns	
	Turn-on time	t_{on}		—	20	—		
	Fall time	t_f		—	—	43		—
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$	—	138		—
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16 \text{ V}, V_{GS} = -5 \text{ V}, I_D = -3.8 \text{ A}$	—	10	—	nC	
Gate-source charge1		Q_{gs1}		—	1.6	—		
Gate-drain ("Miller") charge		Q_{gd}		—	2.1	—		

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-15.2	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -3.8 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V







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