TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U−MOS III)

TPC8210

Lithium Ion Battery Applications
Portable Equipment Applications
Notebook PC Applications

- Low drain−source ON resistance: $R_{DS\ (ON)}$ = 11 mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 13 S (typ.)
- Low leakage current: I_{DSS} = 10 μA (max) (V_{DS} = 30 V)
- Enhancement−mode: V_{th} = 1.3 to 2.5 V (V_{DS} = 10 V, I_D = 1 mA)

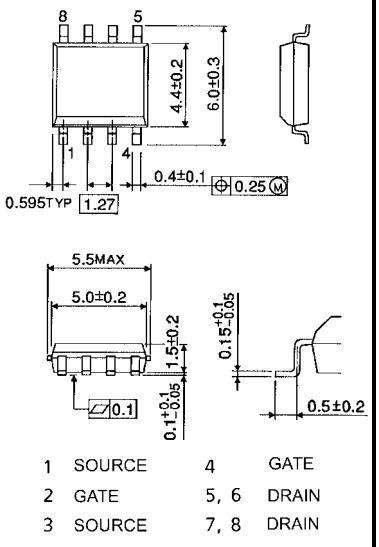
Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	±20	V
Drain current	D C (Note 1)	I_D	8	A
	Pulse (Note 1)	I_{DP}	32	
Drain power dissipation (t = 10 s) (Note 2a)	Single-device operation (Note 3a)	$P_{D\ (1)}$	1.5	W
	Single-device value at dual operation (Note 3b)	$P_{D(2)}$	1.1	
Drain power dissipation (t = 10 s) (Note 2b)	Single-device operation (Note 3a)	$P_{D\ (1)}$	0.75	W
	Single-device value at dual operation (Note 3b)	$P_{D\ (2)}$	0.45	
Single pulse avalanche energy (Note 4)		E_{AS}	83.2	mJ
Avalanche current		I_{AR}	8	A
Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3b, 5)		E_{AR}	0.1	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note: For (Note 1), (Note 2), (Note 3), (Note 4) and (Note 5), please refer to the next page.

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

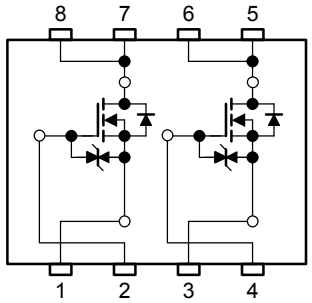
Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-6J1E

Weight: 0.08 g (typ.)

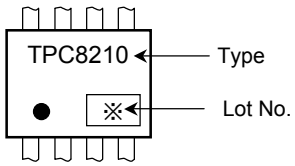
Circuit Configuration



Thermal Characteristics

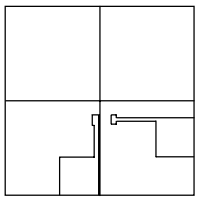
Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	Single-device operation (Note 3a)	$R_{th\ (ch\text{-}a)\ (1)}$	83.3	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th\ (ch\text{-}a)\ (2)}$	114	
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	Single-device operation (Note 3a)	$R_{th\ (ch\text{-}a)\ (1)}$	167	
	Single-device value at dual operation (Note 3b)	$R_{th\ (ch\text{-}a)\ (2)}$	278	

Marking (Note 6)



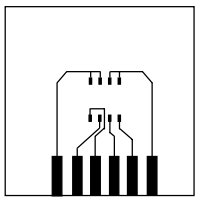
Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2:



FR-4
25.4 × 25.4 × 0.8
(unit: mm)

(a)



FR-4
25.4 × 25.4 × 0.8
(unit: mm)

(b)

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.)

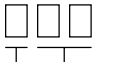
b) The power dissipation and thermal resistance values are shown for a single device. (During dual operation, power is evenly applied to both devices.)

Note 4: V_{DD} = 24 V, T_{ch} = 25°C (initial), L = 1.0 mH, R_G = 25 Ω, I_{AR} = 8 A

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

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

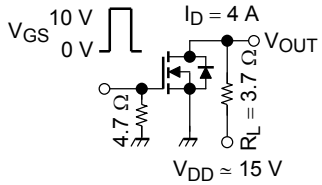
※ Weekly code: (Three digits)



Week of manufacture
(01 for first week of year, continues up to 52 or 53)

Year of manufacture
(One low-order digits of calendar year)

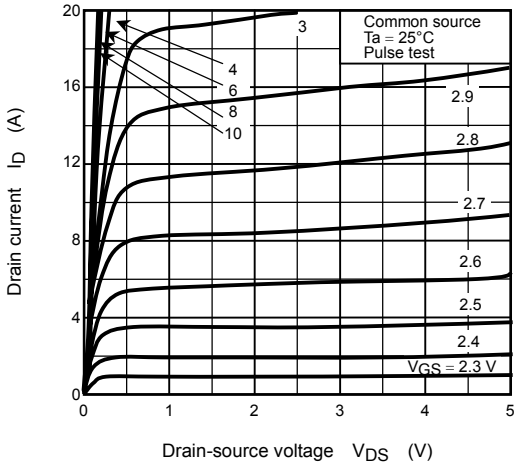
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut−OFF current		I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	—	—	10	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	30	—	—	V
		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = −20 V	15	—	—	
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	1.3	—	2.5	V
Drain−source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 4.5 V, I_D = 4 A	—	13	20	mΩ
		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 4 A	—	11	15	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 4 A	6.5	13	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	3530	—	pF
Reverse transfer capacitance		C_{rss}		—	495	—	
Output capacitance		C_{oss}		—	580	—	
Switching time	Rise time	tr		—	26	—	ns
	Turn−ON time	t_{on}		—	39	—	
	Fall time	t_f		—	32	—	
	Turn−OFF time	t_{off}	Duty ≦ 1%, t_w = 10 μs	—	115	—	
Total gate charge (Gate−source plus gate−drain)		Q_g	V_{DD} ≈ 24 V, V_{GS} = 10 V, I_D = 8 A	—	75	—	nC
Gate−source charge		Q_{gs}		—	6	—	
Gate−drain (“miller”) charge		Q_{gd}		—	19	—	

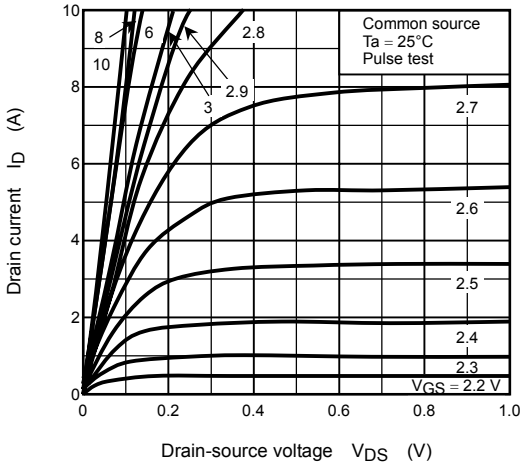
Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	32	A
Forward voltage (diode)		V_{DSF}	I_{DR} = 8 A, V_{GS} = 0 V	—	—	−1.2	V

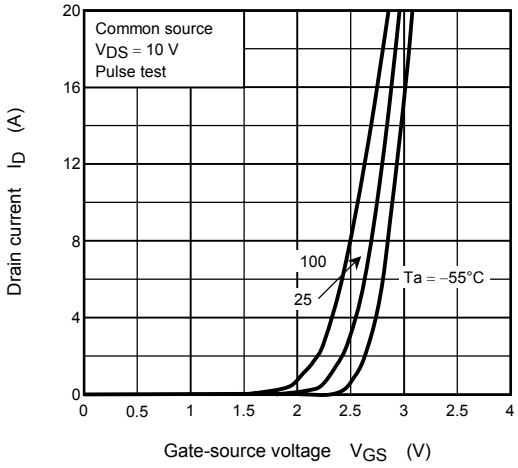
$I_D - V_{DS}$



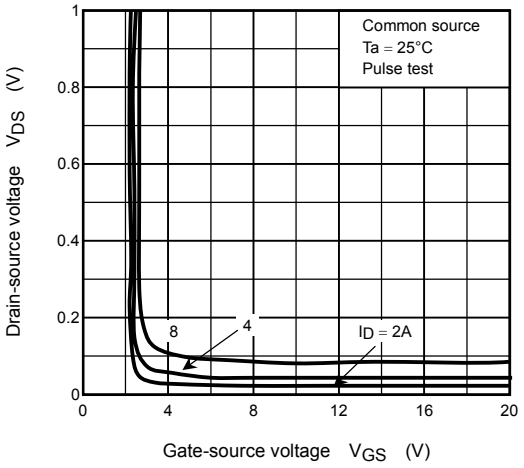
$I_D - V_{DS}$



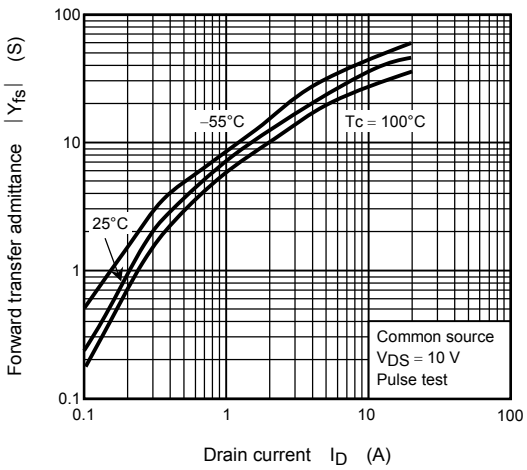
$I_D - V_{GS}$



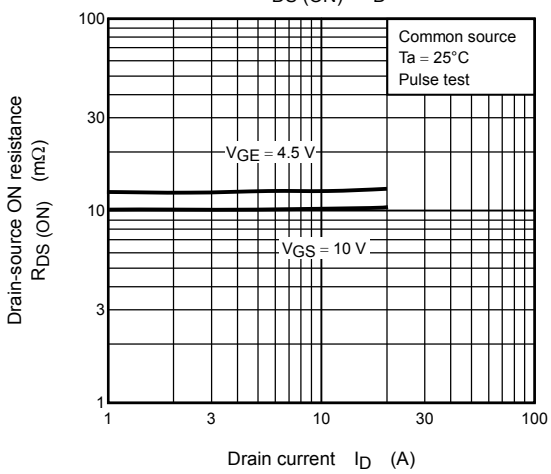
$V_{DS} - V_{GS}$



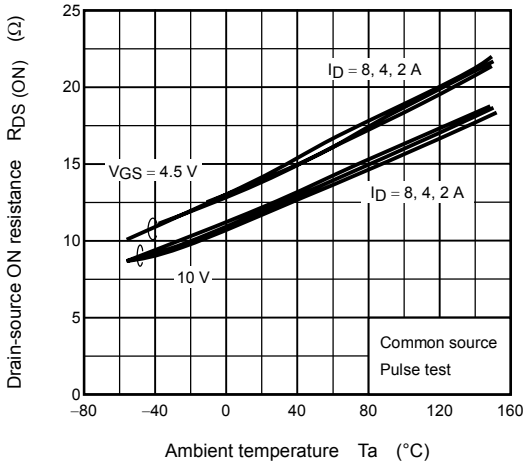
$|Y_{fs}| - I_D$



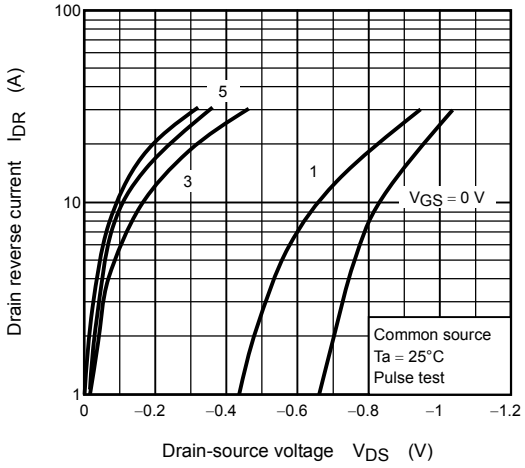
$R_{DS\ (ON)} - I_D$



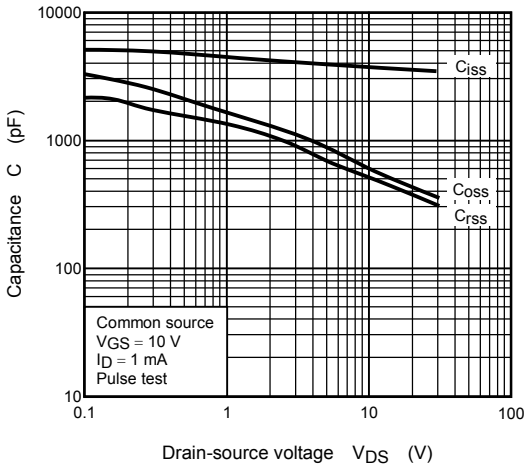
$R_{DS\ (ON)}$ – Ta



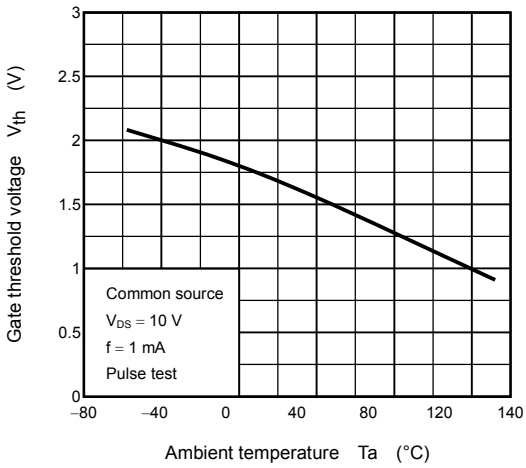
I_{DR} – V_{DS}



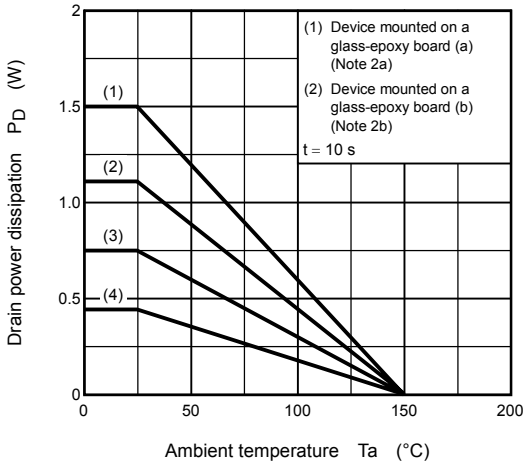
Capacitance – V_{DS}



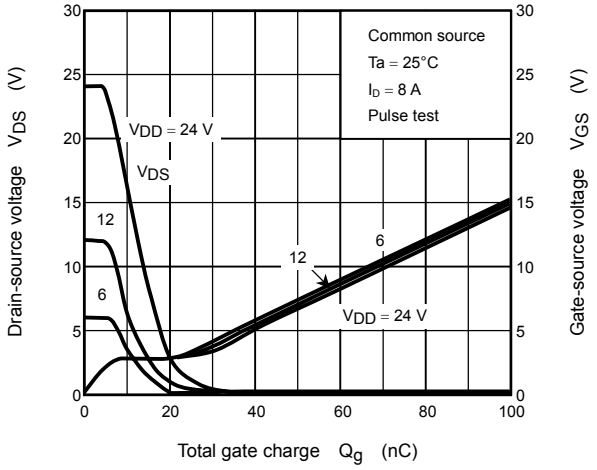
V_{th} – Ta



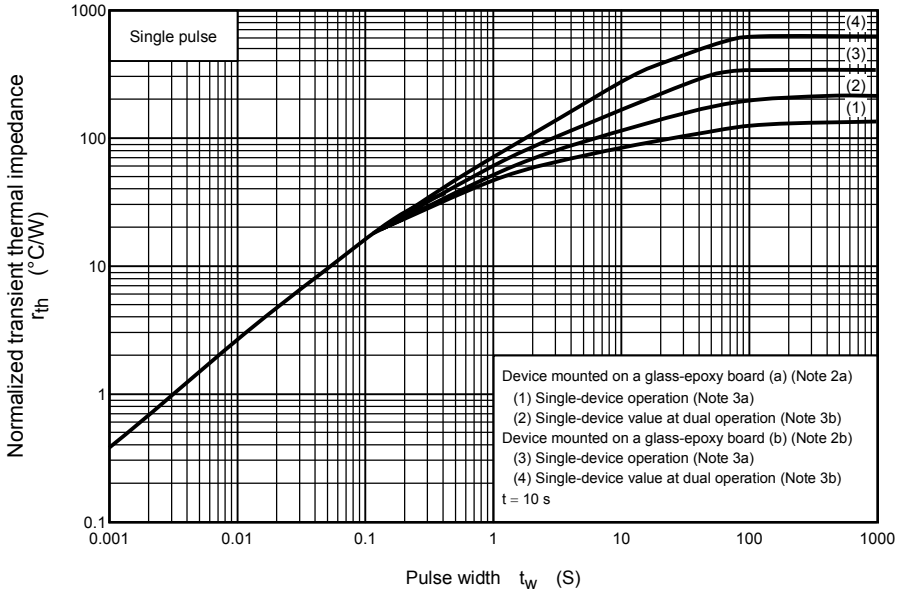
P_D – Ta



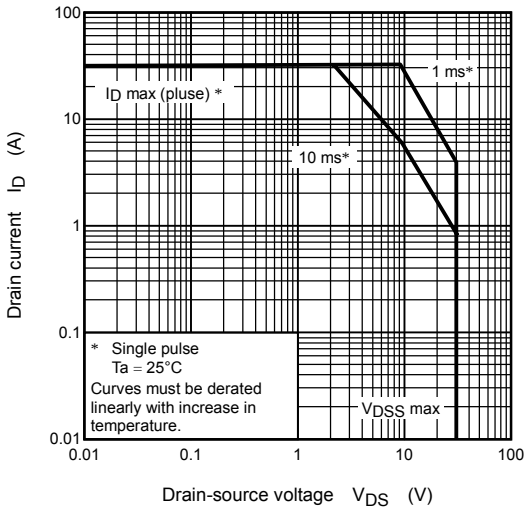
Dynamic input/output characteristics



$r_{th} - t_w$



Safe operating area



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