

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

TPCC8105

Lithium Ion Battery Applications
Power Management Switch Applications

- Small footprint due to a small and thin package
- Low drain-source ON-resistance:
 $R_{DS(ON)} = 6.0 \text{ m}\Omega$ (typ.) ($V_{GS} = -10 \text{ V}$)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -30 \text{ V}$)
- Enhancement mode: $V_{th} = -0.8 \text{ to } -2.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -0.5 \text{ mA}$)

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

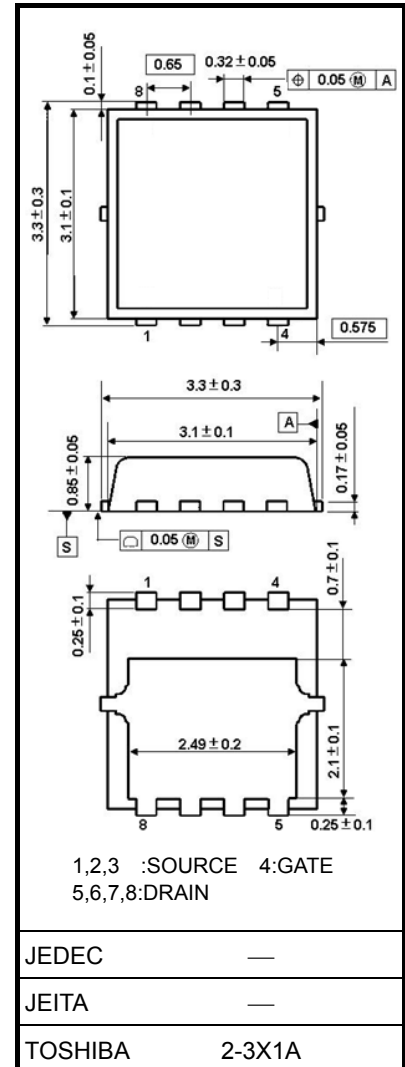
Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	-30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	-30	V
Gate-source voltage	V_{GSS}	-25/+20	V
Drain current	DC (Note 1)	I_D	-23
	Pulsed (Note 1)	I_{DP}	-69
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	30	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)	P_D	1.9	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)	P_D	0.7	W
Single-pulse avalanche energy (Note 3)	E_{AS}	138	mJ
Avalanche current	I_{AR}	-23	A
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.

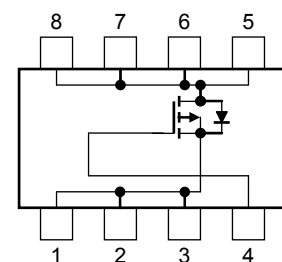
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within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

Unit: mm



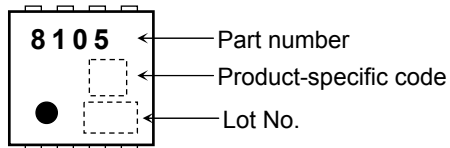
Circuit Configuration



Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case ($T_c = 25^\circ\text{C}$)	$R_{th(ch-c)}$	4.16	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a)	$R_{th(ch-a)}$	65.7	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2b)	$R_{th(ch-a)}$	178	$^\circ\text{C/W}$

Marking

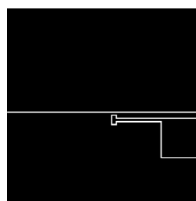


Note 1: Ensure that the channel temperature does not exceed 150°C .

Note 2

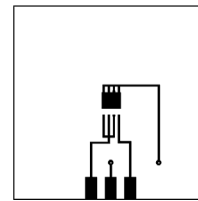
a: Device mounted on a glass-epoxy board (a)

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



(a)

FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)

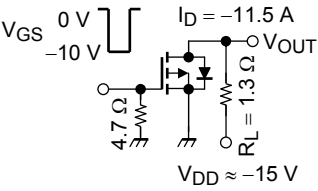


(b)

FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)

Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 200\ \mu\text{H}$, $R_G = 1\ \Omega$, $I_{AR} = -23\text{ A}$

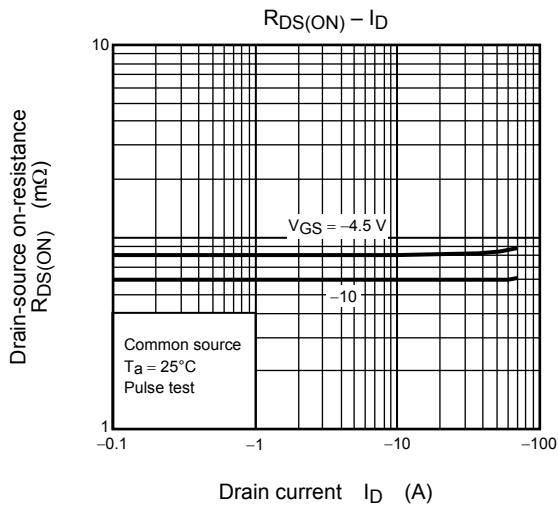
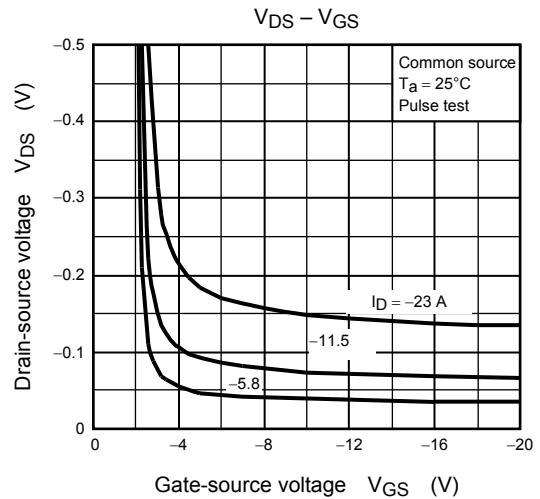
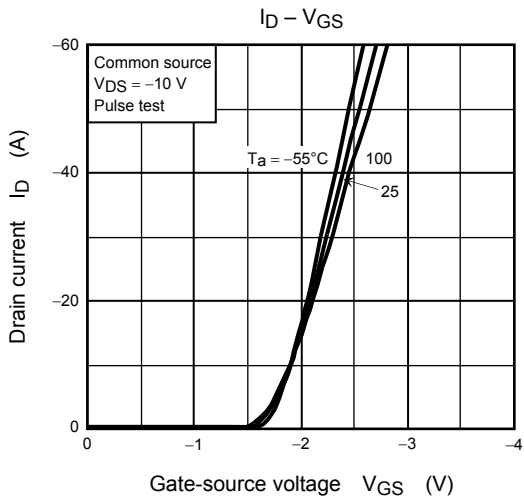
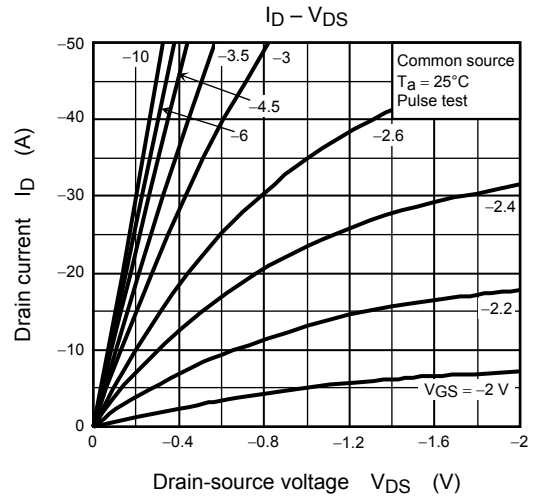
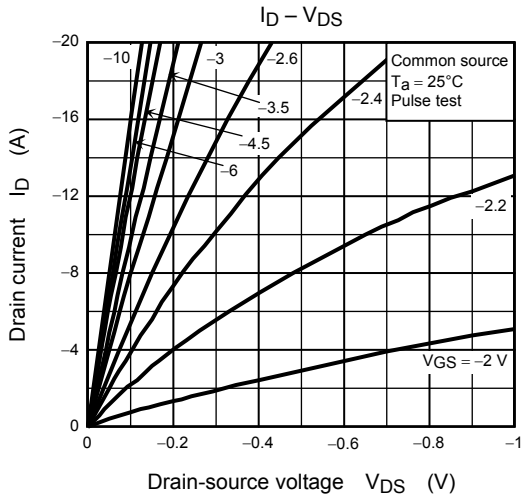
Electrical Characteristics (T_a = 25°C)

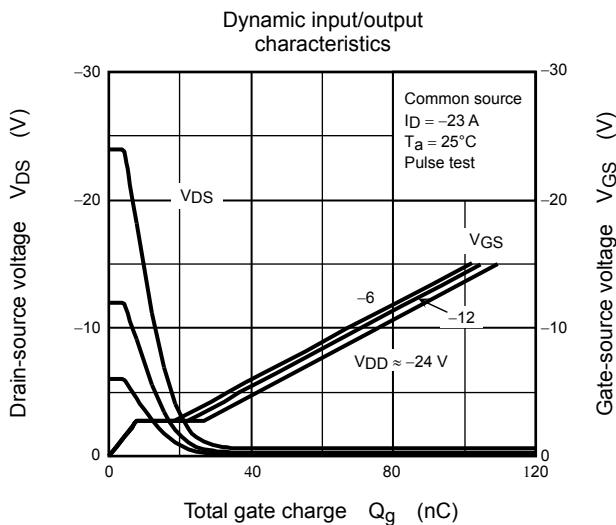
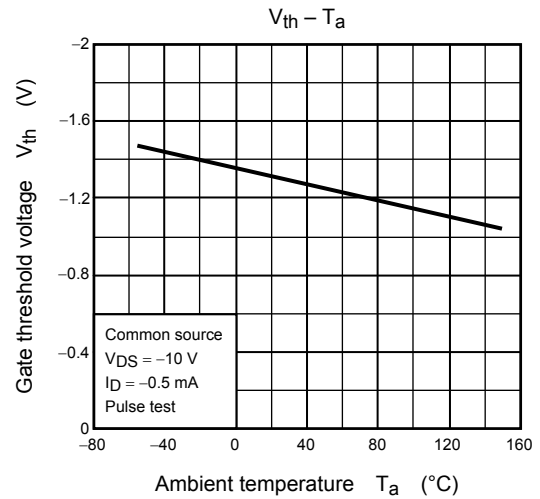
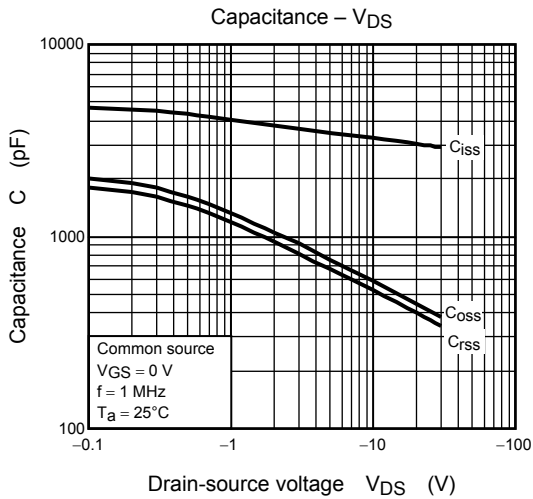
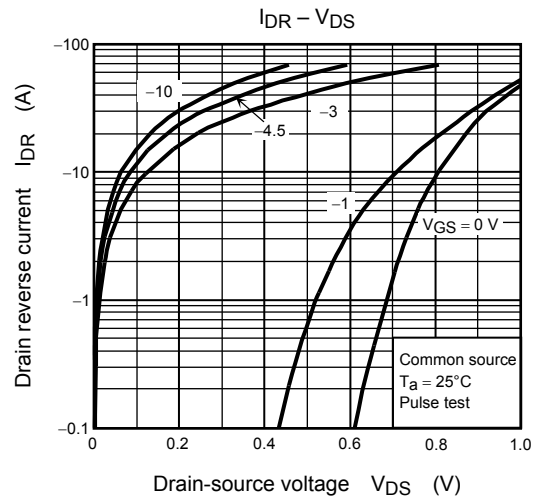
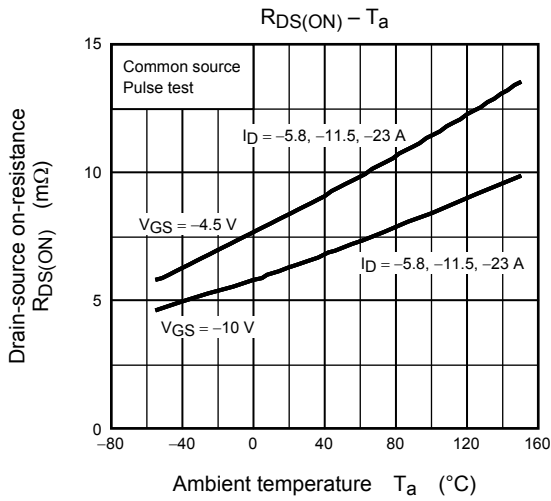
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V	—	—	±100	nA
Drain cutoff current		I _{DSS}	V _{DS} = -30 V, V _{GS} = 0 V	—	—	-10	μA
Drain-source breakdown voltage		V _{(BR)DSS}	I _D = -10 mA, V _{GS} = 0 V	-30	—	—	V
		V _{(BR)DSX}	I _D = -10 mA, V _{GS} = 10 V (Note 4)	-21	—	—	
Gate threshold voltage		V _{th}	V _{DS} = -10 V, I _D = -0.5 mA	-0.8	—	-2.0	V
Drain-source on-resistance		R _{DS(ON)}	V _{GS} = -4.5V, I _D = -11.5 A	—	8	10.4	mΩ
			V _{GS} = -10 V, I _D = -11.5 A	—	6	7.8	
Input capacitance		C _{iss}	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	—	3240	—	pF
Reverse transfer capacitance		C _{rss}		—	520	—	
Output capacitance		C _{oss}		—	580	—	
Switching time	Rise time	t _r		—	8	—	ns
	Turn-on time	t _{on}		—	14	—	
	Fall time	t _f		—	110	—	
	Turn-off time	t _{off}		Duty ≤ 1%, t _w = 10 μs	—	330	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ -24 V, V _{GS} = -10 V, I _D = -23 A	—	76	—	nC
Gate-source charge 1		Q _{gs1}		—	7.6	—	
Gate-drain ("Miller") charge		Q _{gd}		—	20	—	

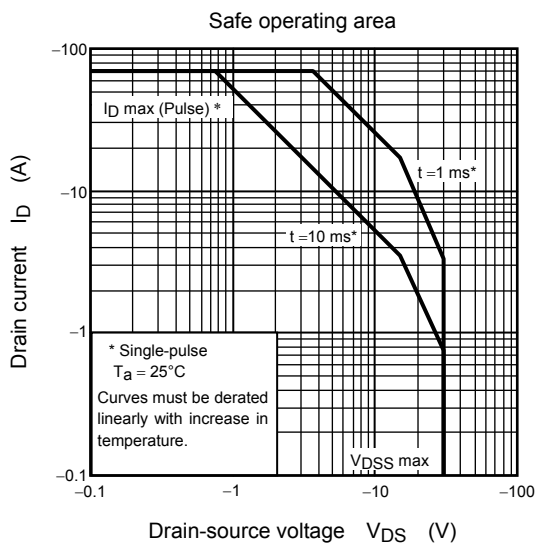
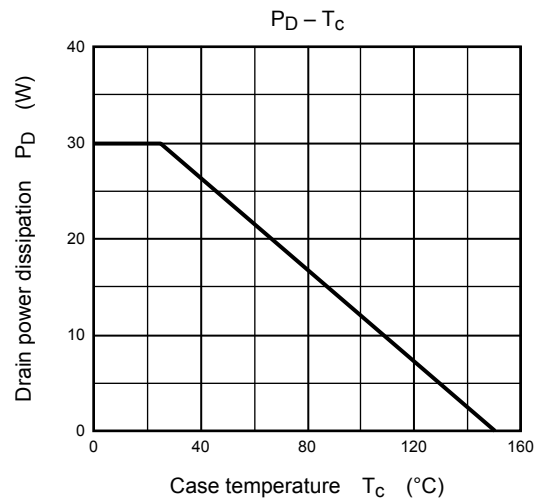
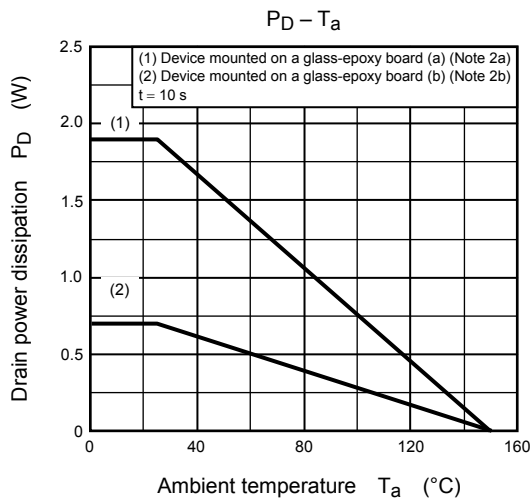
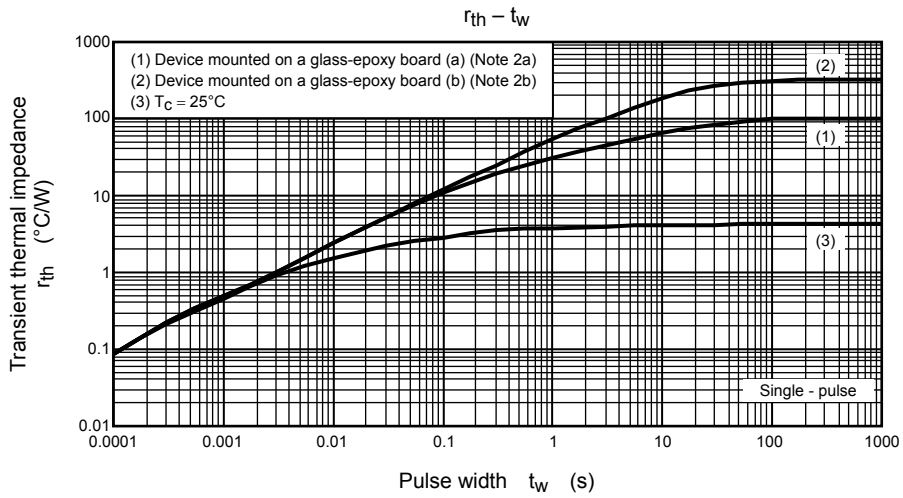
Source-Drain Ratings and Characteristics (T_a = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I _{DRP}	—	—	—	-69	A
Forward voltage (diode)		V _{DSF}	I _{DR} = -23 A, V _{GS} = 0 V	—	—	1.2	V

Note 4: V_{DSX} mode (the application of a plus voltage between gate and source) may cause decrease in maximum rating of drain-source voltage.







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