TOSHIBA Power MOS FET Module Silicon P Channel MOS Type (Four L^2-π-MOSV in One)

MP4208

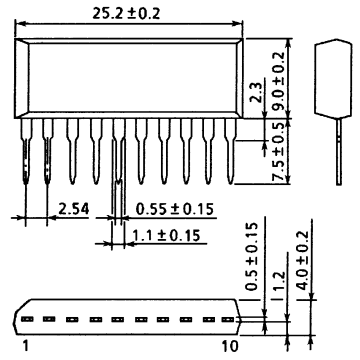
Industrial Applications

High Power High Speed Switching Applications

Hammer Drive, Pulse Motor Drive and Inductive Load Switching

- −4 V gate drive available
- Small package by full molding (SIP 10 pin)
- High drain power dissipation (4-device operation)
  : P_T = 4 W (Ta = 25°C)
- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 0.2 Ω (typ.)
- Low leakage current: I_{GSS} = ±10 μA (max) (V_{GS} = ±16 V)
  I_{DSS} = −100 μA (max) (V_{DS} = −60 V)
- Enhancement-mode: V_{th} = −0.8 to −2.0 V (I_D = −1 mA)

Unit: mm



1, 10	SOURCE
2, 4, 6, 8	GATE
3, 5, 7, 9	DRAIN

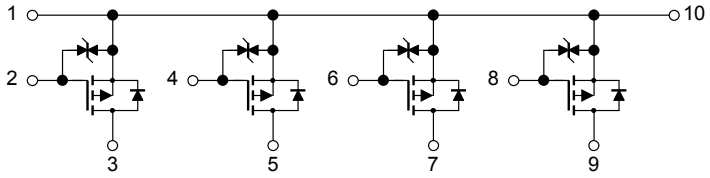
JEDEC	—
JEITA	—
TOSHIBA	2-25A1D

Weight: 2.1 g (typ.)

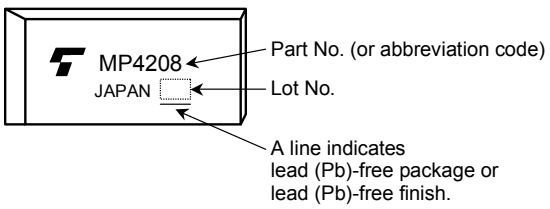
Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	−60	V
Gate-source voltage	V_{GSS}	±20	V
Drain current	I_D	−5	A
Peak drain current	I_{DP}	−10	A
Drain power dissipation (1-device operation, Ta = 25°C)	P_D	2.0	W
Drain power dissipation (4-device operation, Ta = 25°C)	P_{DT}	4.0	W
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Array Configuration



Marking

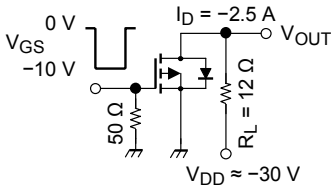


Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance from channel to ambient (4-device operation, Ta = 25°C)	$\Sigma R_{th\ (ch\text{-}a)}$	31.3	°C/W
Maximum lead temperature for soldering purposes (3.2 mm from case for 10 s)	T_L	260	°C

This transistor is an electrostatic-sensitive device. Please handle withccaution.

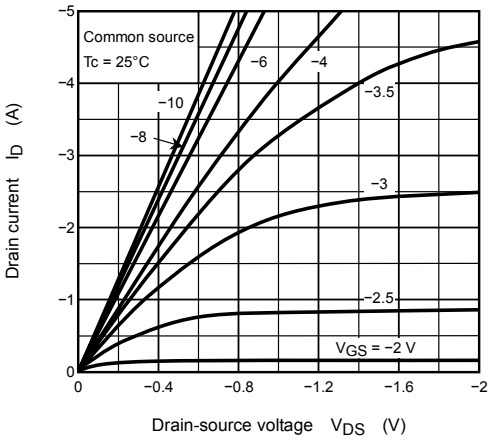
Electrical Characteristics (Ta = 25°C)

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} = −60 V, V_{GS} = 0 V	—	—	−100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = −10 mA, V_{GS} = 0 V	−60	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = −10 V, I_D = −1 mA	−0.8	—	−2.0	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −10 V, I_D = −2.5 A	1	3	—	S
Drain-source ON resistance		$R_{DS\ (ON)}$	I_D = −2.5 A, V_{GS} = −4 V	—	0.3	0.5	Ω
		$R_{DS\ (ON)}$	I_D = −2.5 A, V_{GS} = −10 V	—	0.2	0.3	
Input capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0 V, f = 1 MHz	—	630	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = −10 V, V_{GS} = 0 V, f = 1 MHz	—	95	—	pF
Output capacitance		C_{oss}	V_{DS} = −10 V, V_{GS} = 0 V, f = 1 MHz	—	290	—	pF
Switching time	Rise time	t_r	 V_{IN}: t_r, t_f < 5 ns, duty ≤ 1%, t_w = 10 μs	—	25	—	ns
	Turn-on time	t_{on}		—	45	—	
	Fall time	t_f		—	55	—	
	Turn-off time	t_{off}		—	200	—	
Total gate charge (gate-source plus gate-drain)		Q_g	I_D = −5 A, V_{GS} = −10 V, V_{DD} ≈ 48 V	—	22	—	nC
Gate-source charge		Q_{gs}		—	16	—	nC
Gate-drain (“miller”) charge		Q_{gd}		—	6	—	nC

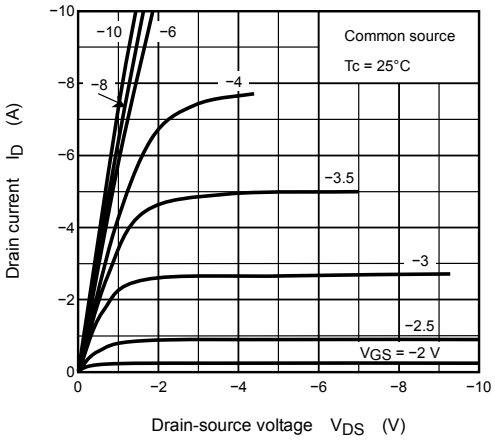
Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	I_{DR}	—	—	—	−5	A
Peak drain reverse current	I_{DRP}	—	—	—	−10	A
Diode forward voltage	V_{DSF}	I_{DR} = −5 A, V_{GS} = 0 V	—	1.0	2.0	V
Reverse recovery time	t_{rr}	I_{DR} = −5 A, V_{GS} = 0 V	—	80	—	ns
Reverse recovery charge	Q_{rr}	dI_{DR}/dt = −50 A/μs	—	0.1	—	μC

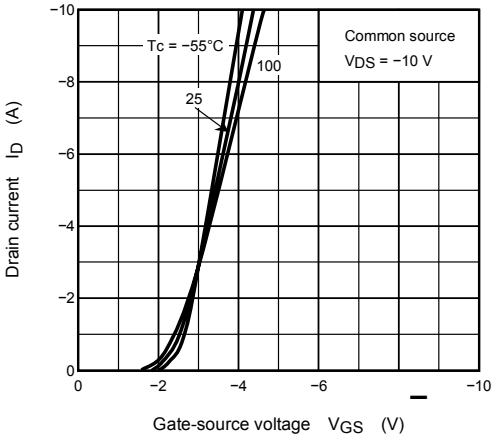
$I_D - V_{DS}$



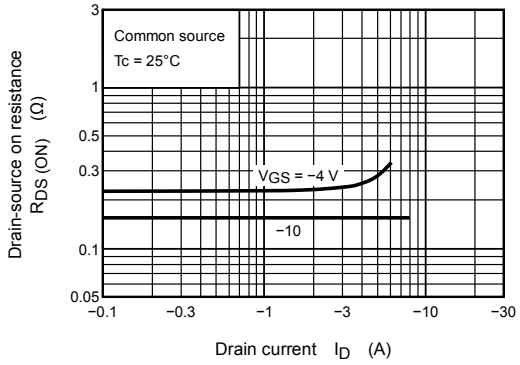
$I_D - V_{DS}$



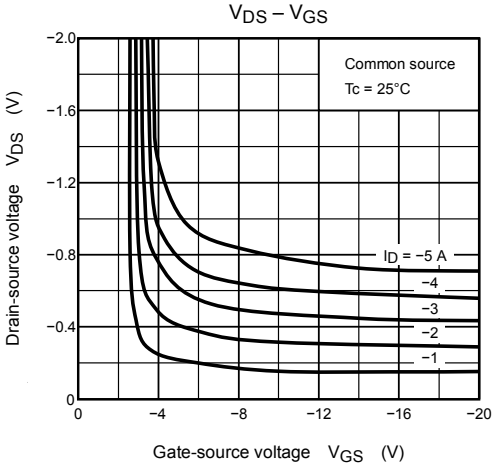
$I_D - V_{GS}$



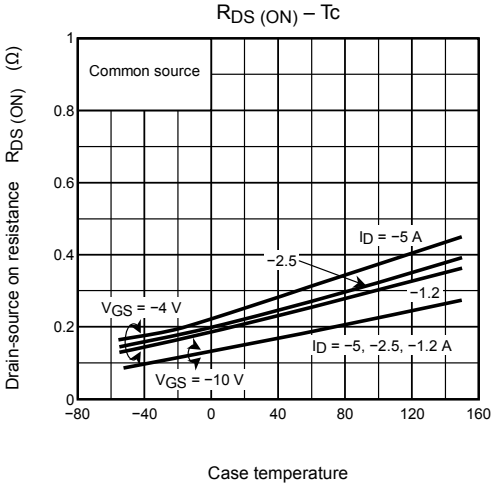
$R_{DS\ (ON)} - I_D$



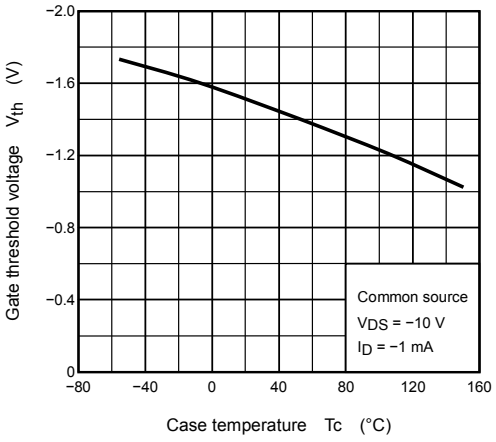
$V_{DS} - V_{GS}$



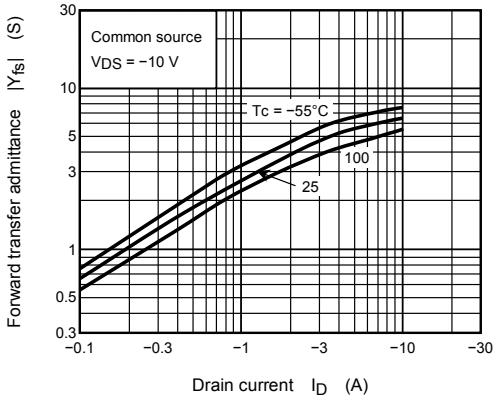
$R_{DS\ (ON)} - Tc$



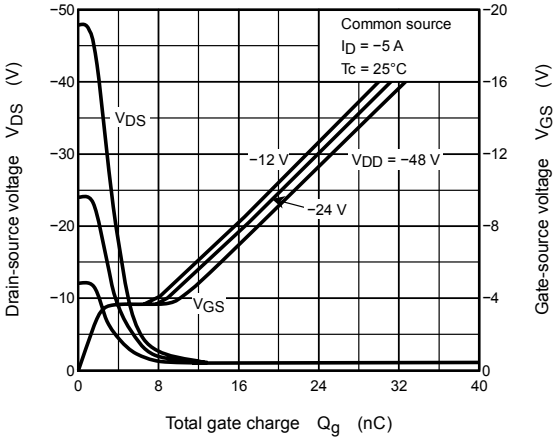
V_{th} – Tc



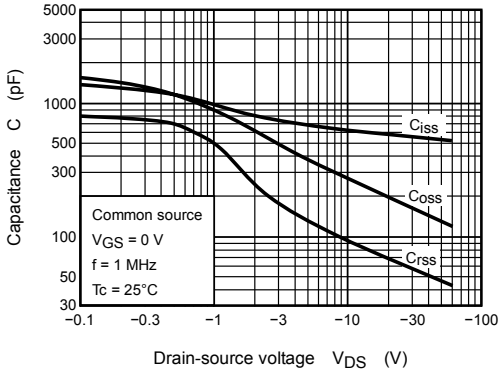
$|Y_{fs}|$ – I_D



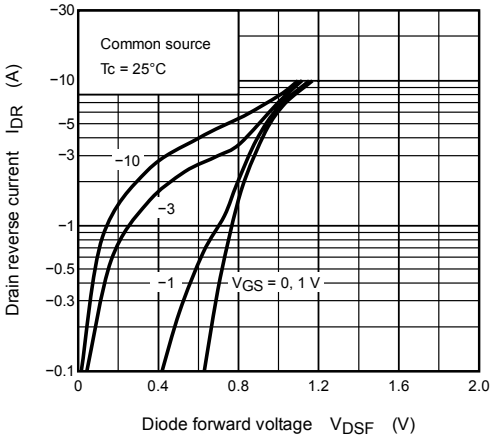
Dynamic Input/Output Characteristics



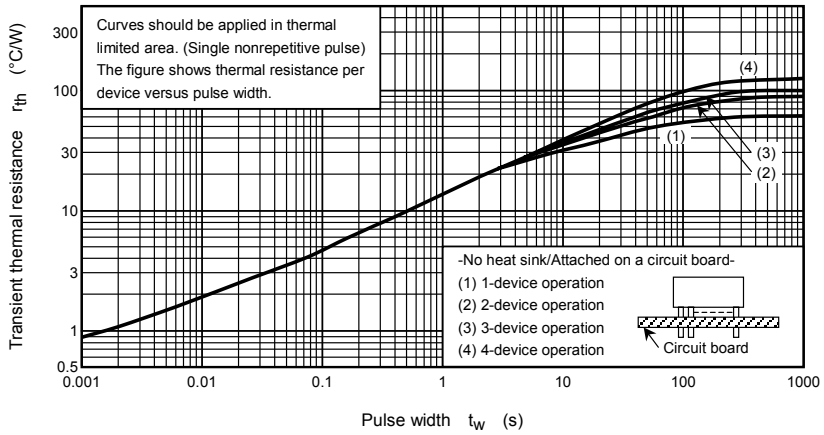
Capacitance – V_{DS}



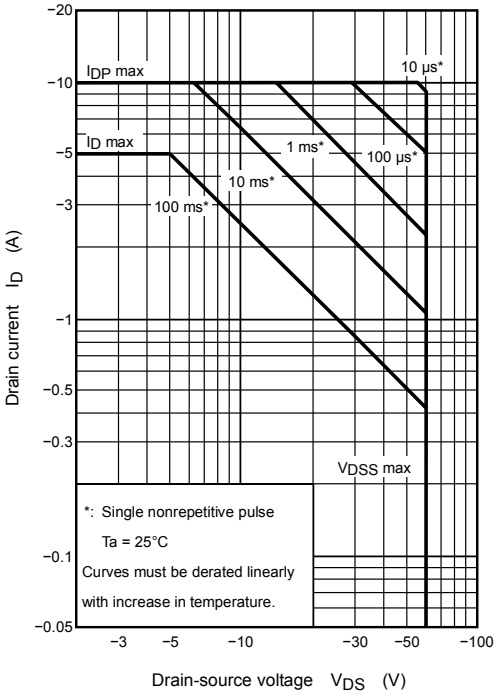
I_{DR} – V_{DSF}



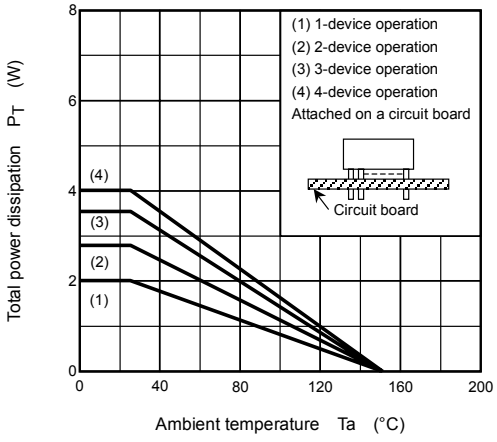
$r_{th} - t_w$



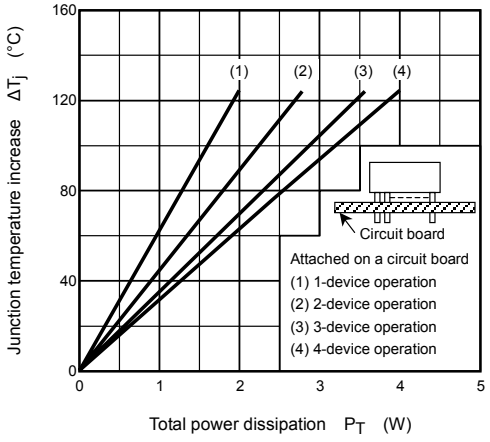
Safe Operating Area



$P_T - Ta$



$\Delta T_j - P_T$



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