

TOSHIBA Power MOS FET Module Silicon P Channel MOS Type (L²-π-MOSV 4 in 1)

MP4211

High Power, High Speed Switching Applications
 For Printer Head Pin Driver and Pulse Motor Driver
 For Solenoid Driver

- 4 V gate drive available
- Small package by full molding (SIP 10 pin)
- High drain power dissipation (4 devices operation)
 : P_T = 4 W (T_a = 25°C)
- Low drain-source ON resistance: R_{DS (ON)} = 0.16 Ω (typ.)
- High forward transfer admittance: |Y_{fs}| = 4.0 S (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 (V_{DS} = -10 V, I_D = -1 mA)

Maximum Ratings (T_a = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V _{DSS}	-60	V
Drain-gate voltage (R _{GS} = 20 kΩ)		V _{DGR}	-60	V
Gate-source voltage		V _{GSS}	±20	V
Drain current	DC	I _D	-5	A
	Pulse	I _{DP}	-20	
Drain power dissipation (1 device operation, T _a = 25°C)		P _D	2.0	W
Drain power dissipation (4 devices operation, T _a = 25°C)		P _{DT}	4.0	W
Single pulse avalanche energy (Note 1)		E _{AS}	273	mJ
Avalanche current		I _{AR}	-5	A
Repetitive avalanche energy (Note 2)	1 device operation	E _{AR}	0.2	mJ
	4 devices operation	E _{ART}	0.4	
Channel temperature		T _{ch}	150	°C
Storage temperature range		T _{stg}	-55 to 150	°C

Note 1: Avalanche energy (single pulse) applied condition

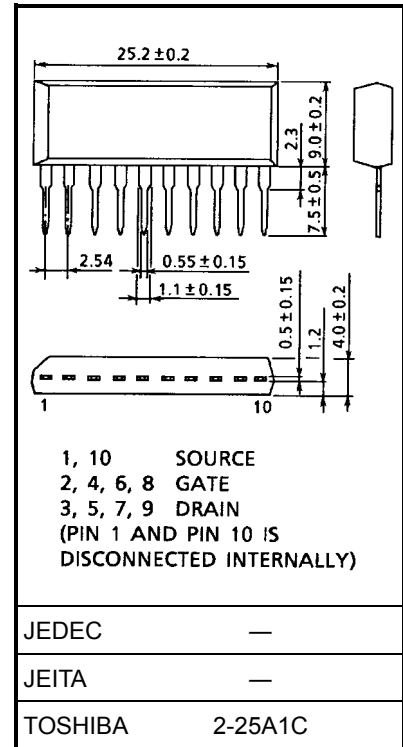
V_{DD} = -25 V, starting T_{ch} = 25°C, L = 14.84 mH, R_G = 25 Ω, I_{AR} = -5 A

Note 2: Repetitive rating; pulse width limited by maximum channel temperature.

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

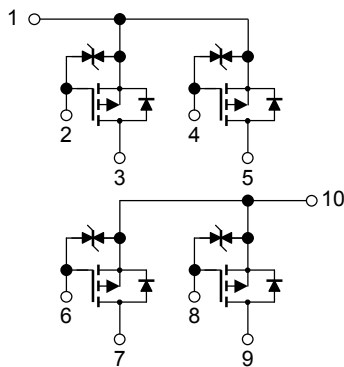
Industrial Applications

Unit: mm



Weight: 2.1 g (typ.)

Array Configuration



Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance of channel to ambient (4 devices operation, $T_a = 25^\circ\text{C}$)	$\Sigma R_{th(ch-a)}$	31.2	$^\circ\text{C/W}$
Maximum lead temperature for soldering purposes (3.2 mm from case for $t = 10\text{ s}$)	T_L	260	$^\circ\text{C}$

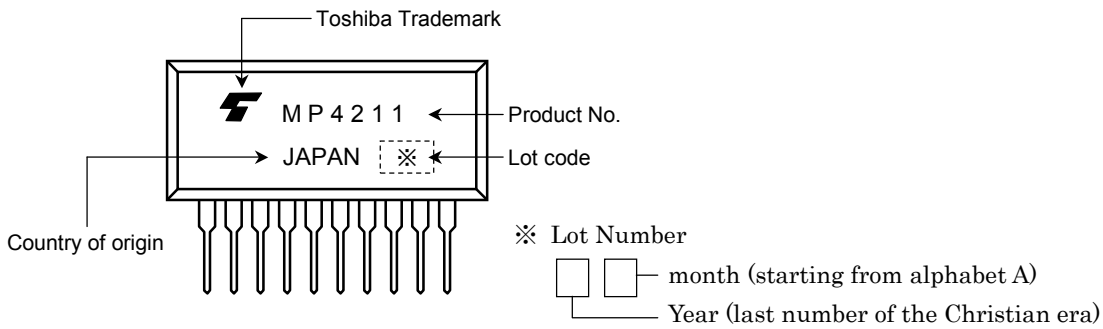
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

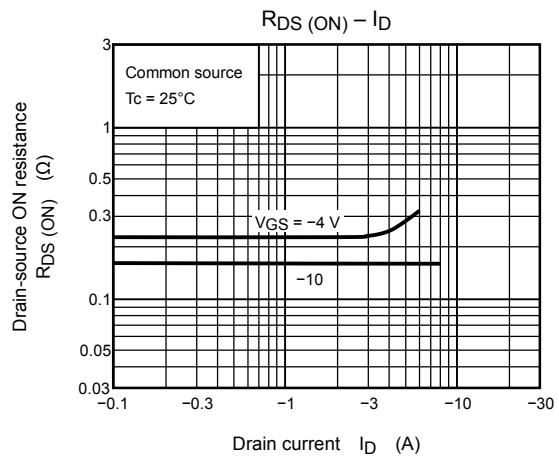
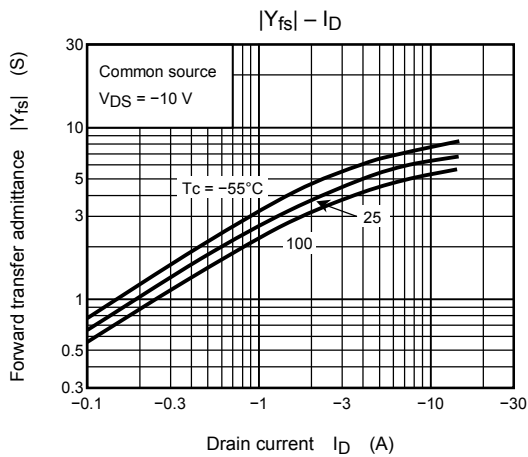
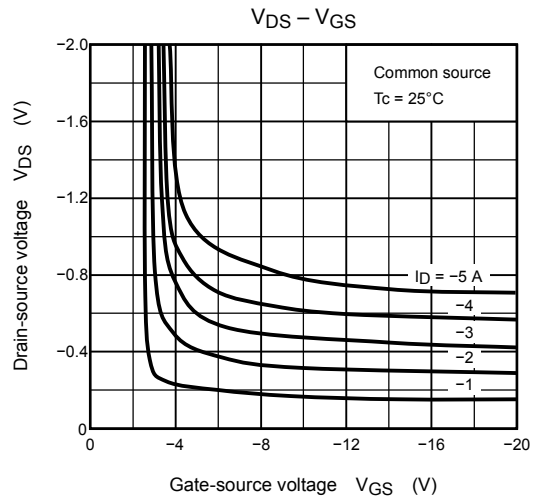
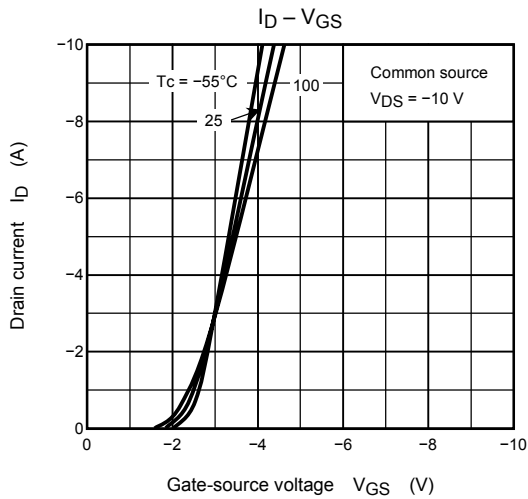
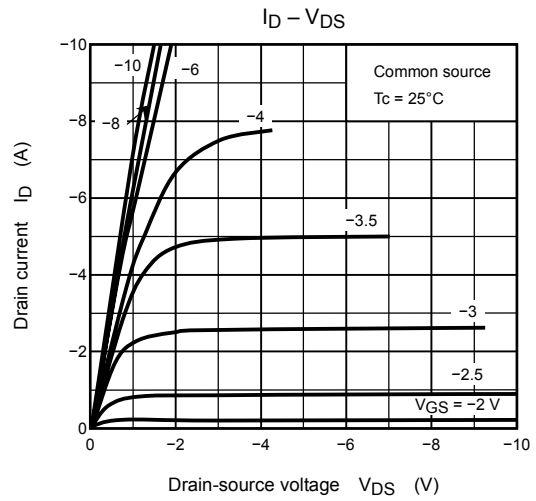
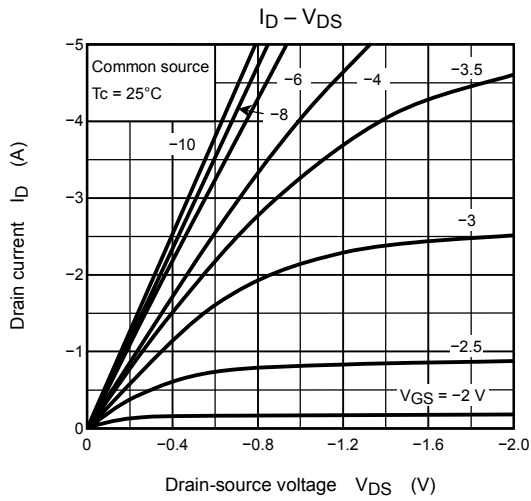
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-60	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -2.5\text{ A}$	—	0.24	0.28	Ω
			$V_{GS} = -10\text{ V}, I_D = -2.5\text{ A}$	—	0.16	0.19	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	2.0	4.0	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	630	—	pF
Reverse transfer capacitance		C_{rss}		—	95	—	pF
Output capacitance		C_{oss}		—	290	—	pF
Switching time	Rise time	t_r		—	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	$V_{DD} \approx -48\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	—	22	—	nC
Gate-source charge		Q_{gs}		—	16	—	nC
Gate-drain ("miller") charge		Q_{gd}		—	6	—	nC

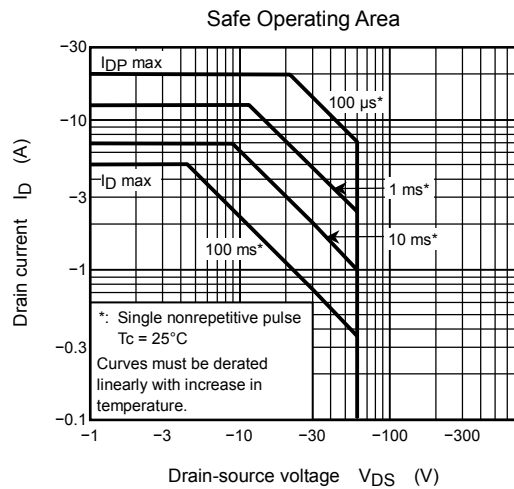
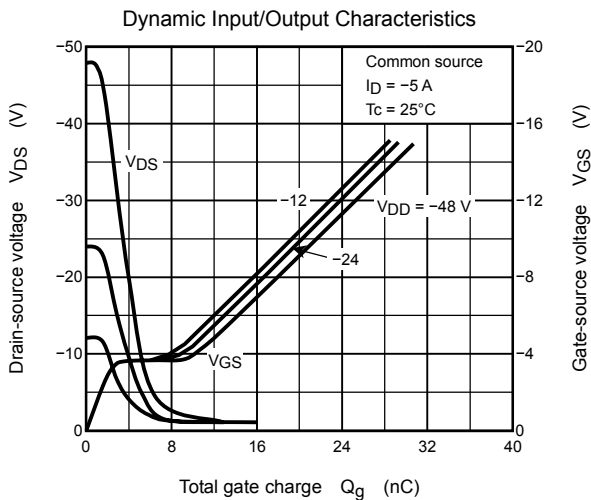
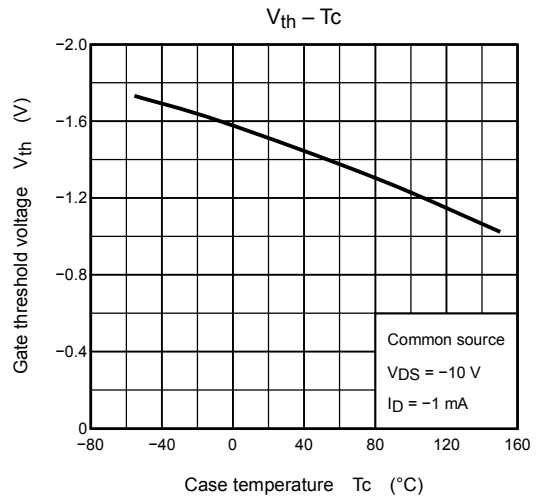
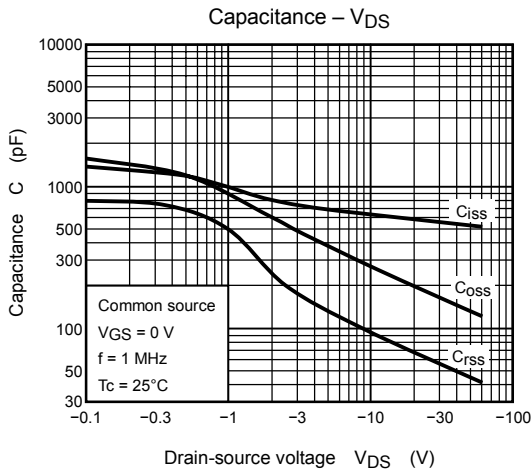
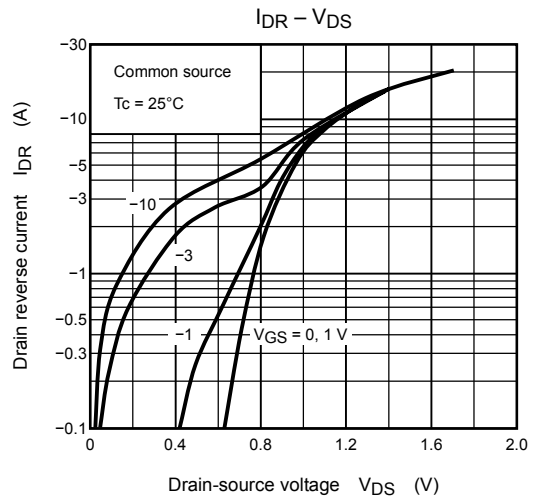
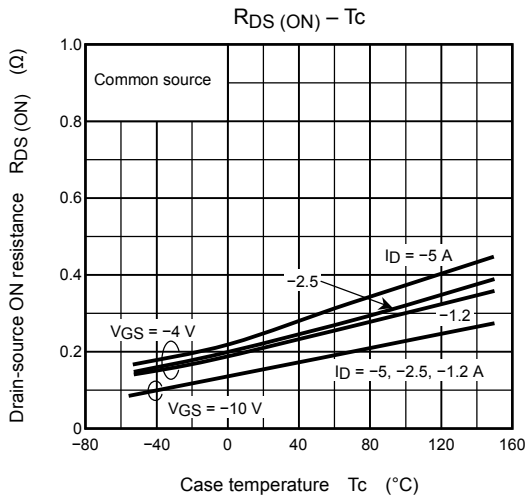
Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

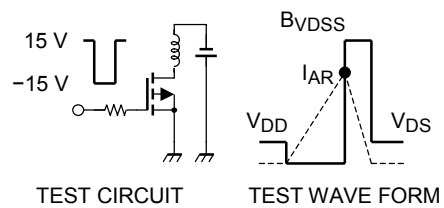
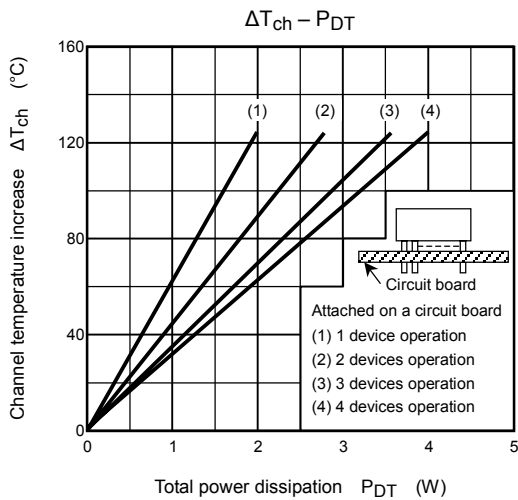
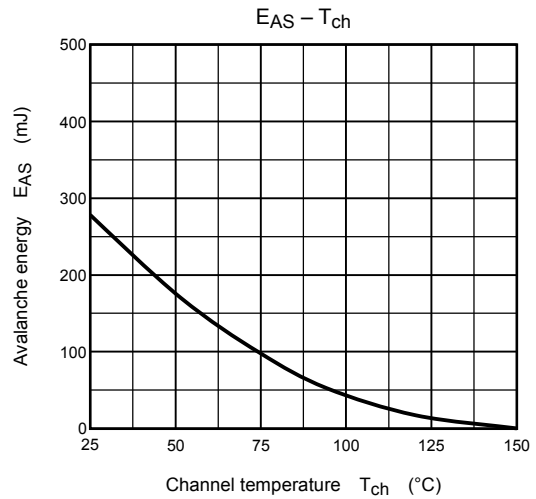
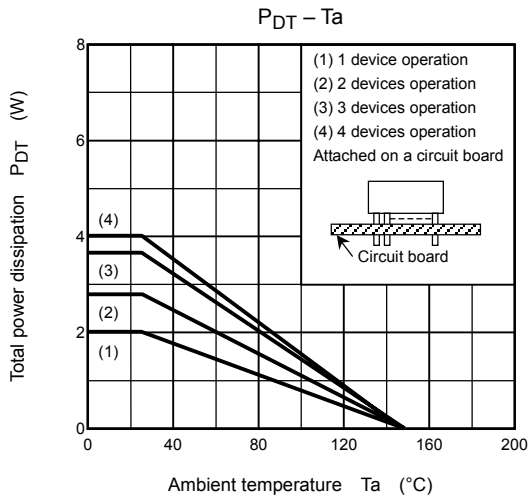
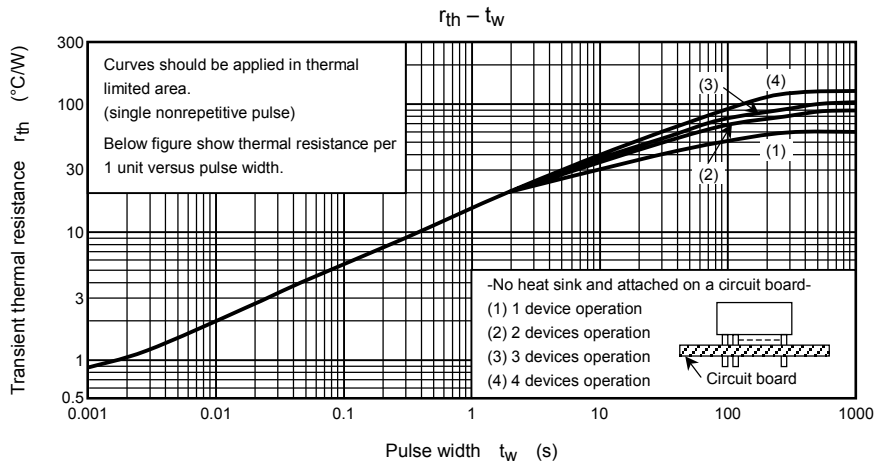
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current	I_{DR}	—	—	—	-5	A
Pulse drain reverse current	I_{DRP}	—	—	—	-20	A
Diode forward voltage	V_{DSF}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$ $di_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	80	—	ns
Reverse recovery charge	Q_{rr}		—	0.1	—	μC

Marking









Peak $I_{AR} = -5 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = -25 \text{ V}$, $L = 14.84 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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