

TOSHIBA Power MOS FET Module Silicon N Channel MOS Type (Four L²-π-MOSV inOne)**MP4711**

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

- 4-V gate drivability
- Package with heat sink isolated to lead (SIP 12 pins)
- High drain power dissipation (4-device operation)
 $P_T = 36 \text{ W}$ ($T_c = 25^\circ\text{C}$)
- Low drain-source ON resistance: $R_{DS(\text{ON})} = 0.17 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 4.5 \text{ S}$ (typ.)
- Low leakage current: $I_{GSS} = \pm 10 \mu\text{A}$ (max) ($V_{GS} = \pm 16 \text{ V}$)
 $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- Enhancement-mode: $V_{th} = 0.8$ to 2.0 V ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	100	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, $T_a = 25^\circ\text{C}$)		P_D	3.0	W
Drain power dissipation (4-device operation)	$T_a = 25^\circ\text{C}$	P_{DT}	5.0	W
	$T_c = 25^\circ\text{C}$		36	
Single pulse avalanche energy (Note 1)		E_{AS}	180	mJ
Avalanche current		I_{AR}	5	A
Repetitive avalanche energy (Note 2)	1-device operation	E_{AR}	0.3	mJ
	4-device operation	E_{ART}	0.5	
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C

Note 1: Condition for avalanche energy (single pulse) measurement

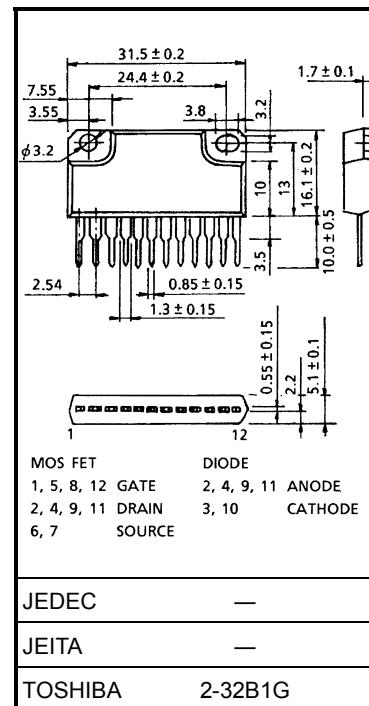
 $V_{DD} = 25 \text{ V}$, starting $T_{ch} = 25^\circ\text{C}$, $L = 11.6 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 5 \text{ A}$

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

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

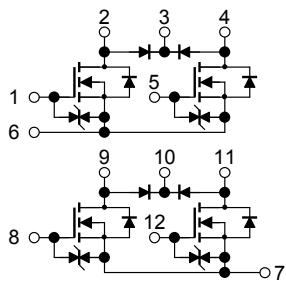
Industrial Applications

Unit: mm



Weight: 6.0 g (typ.)

Array Configuration



Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance from channel to ambient (4-device operation, $T_a = 25^\circ\text{C}$)	ΣR_{th} (ch-a)	25	$^\circ\text{C}/\text{W}$
Thermal resistance from channel to case (4-device operation, $T_c = 25^\circ\text{C}$)	ΣR_{th} (ch-c)	3.47	$^\circ\text{C}/\text{W}$
Maximum lead temperature for soldering purposes (3.2 mm from case for $t = 10$ 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}	$V_{GS} = \pm 16$ V, $V_{DS} = 0$ V		—	—	± 10	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 100$ V, $V_{GS} = 0$ V		—	—	100	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10$ mA, $V_{GS} = 0$ V		100	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10$ V, $I_D = 1$ mA		0.8	—	2.0	V
Drain-source ON resistance	R_{DS} (ON)	$V_{GS} = 4$ V, $I_D = 2.5$ A		—	0.22	0.30	Ω
		$V_{GS} = 10$ V, $I_D = 2.5$ A		—	0.17	0.23	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10$ V, $I_D = 2.5$ A		2.0	4.5	—	S
Input capacitance	C_{iss}	$V_{DS} = 10$ V, $V_{GS} = 0$ V $f = 1$ MHz		—	500	—	pF
Reverse transfer capacitance	C_{rss}			—	80	—	pF
Output capacitance	C_{oss}			—	190	—	pF
Switching time	Rise time	t_r		—	17	—	ns
	Turn-on time	t_{on}		—	25	—	
	Fall time	t_f		—	50	—	
	Turn-off time	t_{off}		—	195	—	
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 80$ V, $V_{GS} = 10$ V $I_D = 5$ A		—	22	—	nC
Gate-source charge	Q_{gs}			—	15	—	nC
Gate-drain ("miller") charge	Q_{gd}			—	7	—	nC

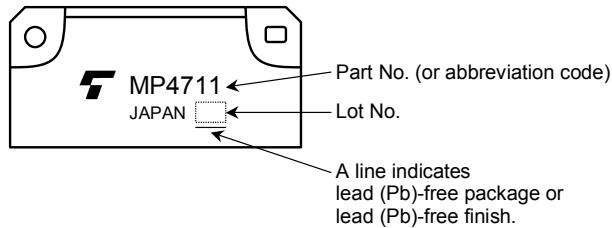
Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

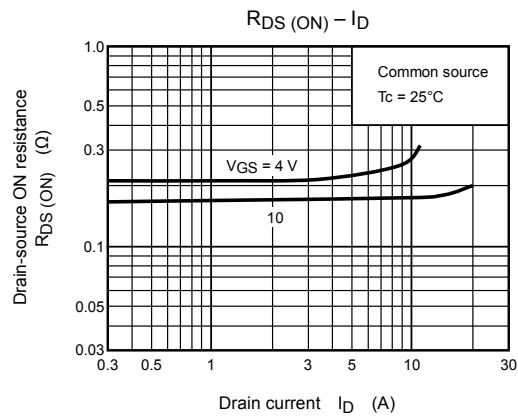
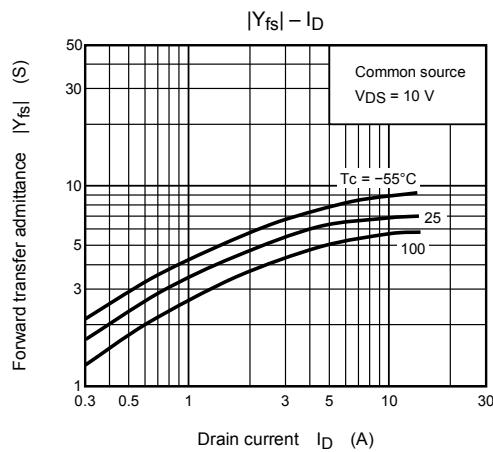
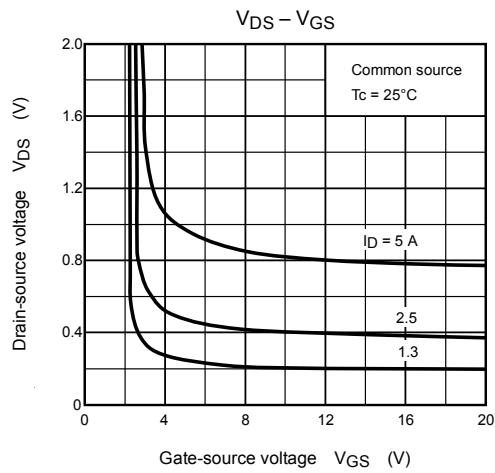
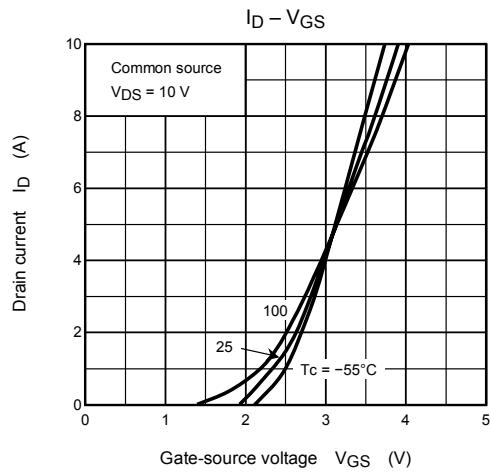
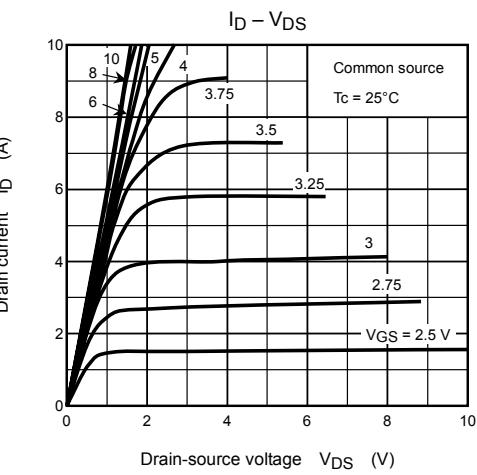
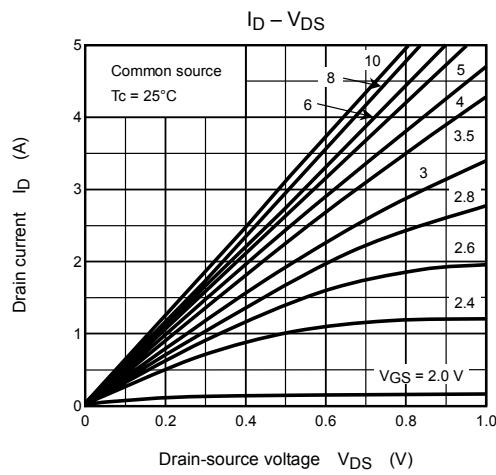
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current	I_{DR}	—	—	—	5	A
Pulse drain reverse current	I_{DRP}	—	—	—	20	A
Diode forward voltage	V_{DSF}	$I_{DR} = 5\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 5\text{ A}$, $V_{GS} = 0\text{ V}$ $dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	160	—	ns
Reverse recovery charge	Q_{rr}		—	0.28	—	μC

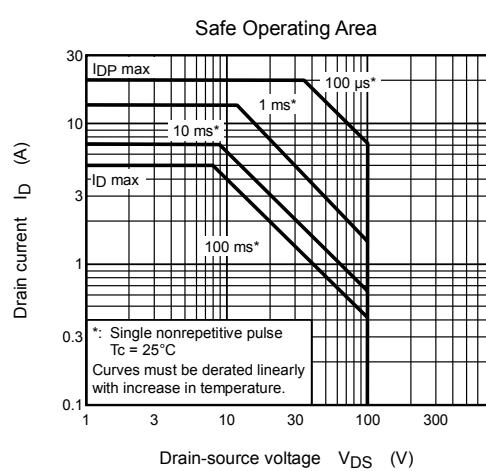
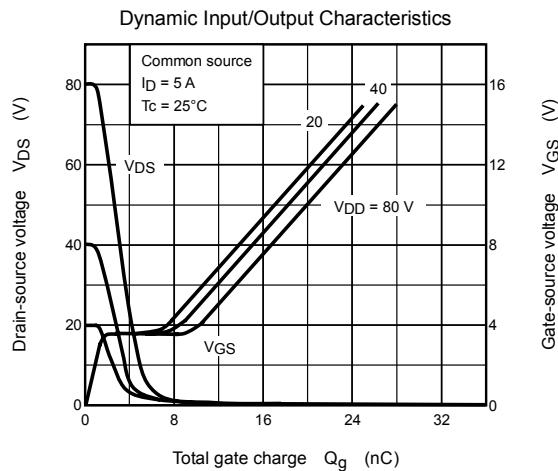
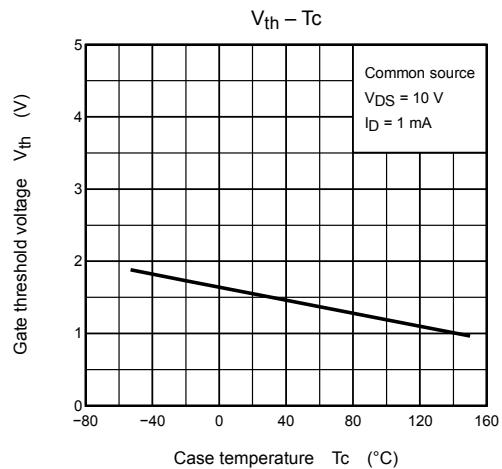
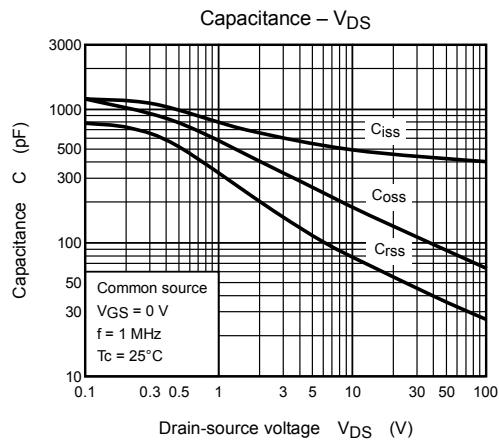
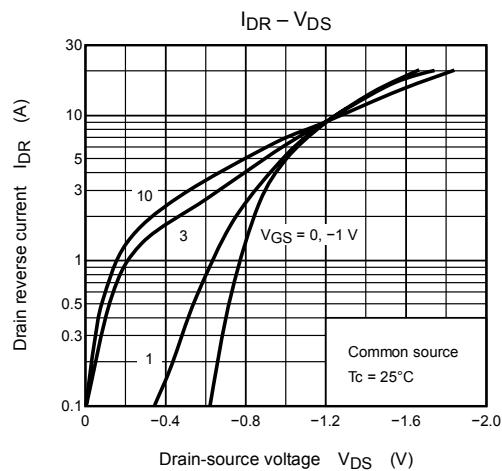
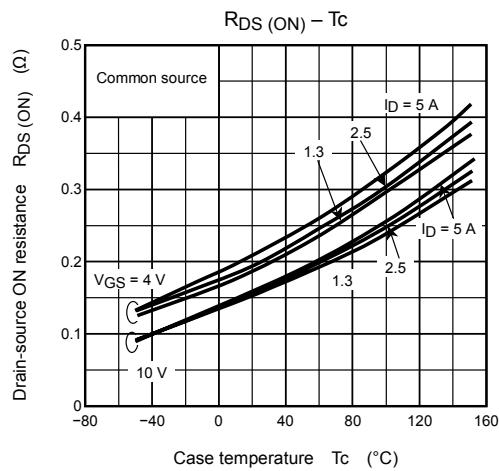
Flyback-Diode Rating and Characteristics (Ta = 25°C)

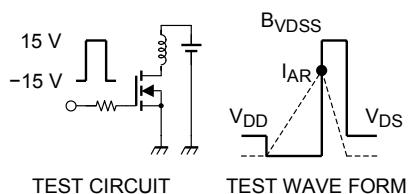
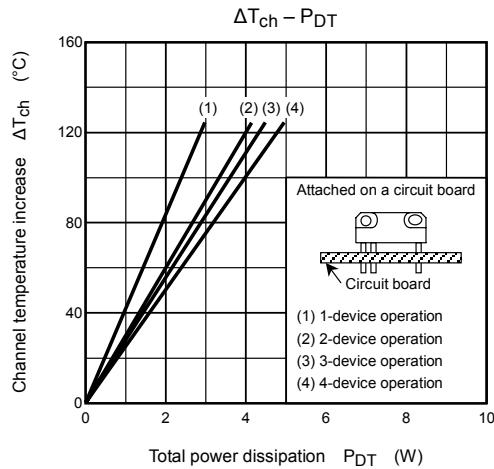
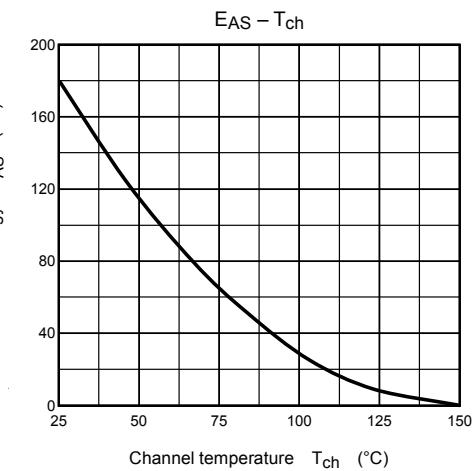
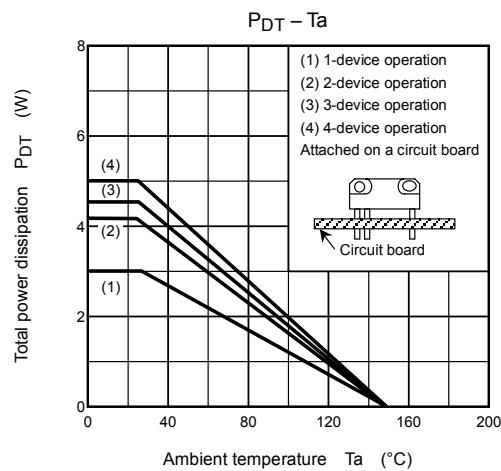
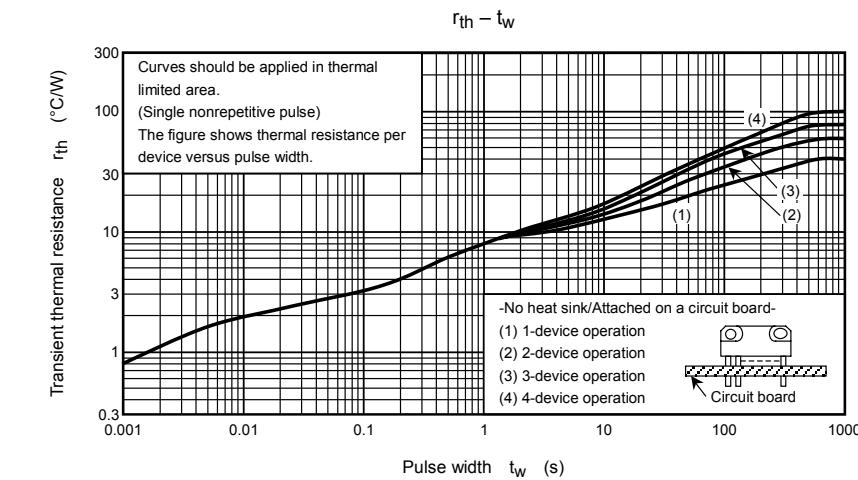
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward current	I_{FM}	—	—	—	5	A
Reverse current	I_R	$V_R = 100\text{ V}$	—	—	0.4	μA
Reverse voltage	V_R	$I_R = 100\text{ }\mu\text{A}$	100	—	—	V
Forward voltage	V_F	$I_F = 2\text{ A}$	—	—	2.3	V

Marking









Peak $I_{AR} = 5 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = 25 \text{ V}$, $L = 11.6 \text{ mH}$

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

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