

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

MP4410

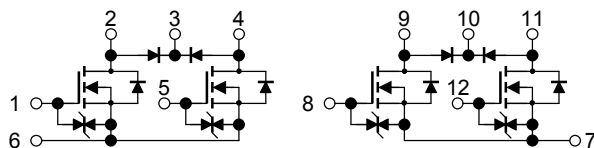
High Power, High Speed Switching Applications.
Hammer Drive, Pulse Motor Drive and Inductive Load Switching.

- 4 V gate drive available
- Small package by full molding (SIP 12 pin)
- High drain power dissipation (4 devices operation)
: $P_T = 28 \text{ W}$ ($T_c = 25^\circ\text{C}$)
- Low drain-source ON resistance: $R_{DS(ON)} = 0.12 \Omega$ (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) ($V_{DS} = 60 \text{ V}$)
- Enhancement-mode: $V_{th} = 0.8$ to 2.0 V ($I_D = 1 \text{ mA}$)

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

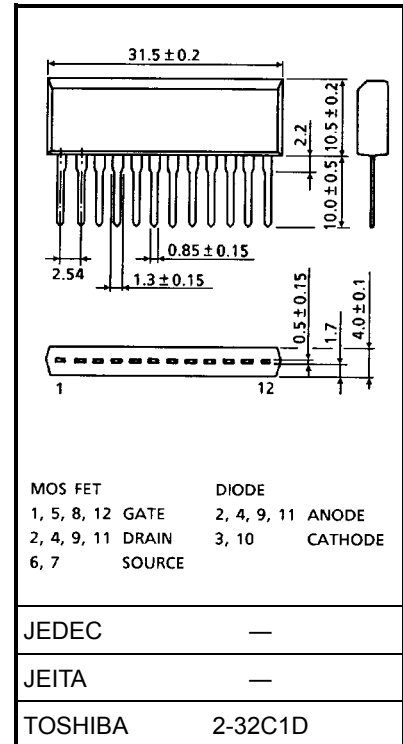
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	60	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	I_D	5	A
Peak drain current	I_{DP}	20	A
Drain power dissipation (1 device operation)	P_D	2.2	W
Drain power dissipation (4 devices operation)	$T_a = 25^\circ\text{C}$	4.4	W
	$T_c = 25^\circ\text{C}$	28	
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

Array Configuration



Industrial Applications

Unit: mm



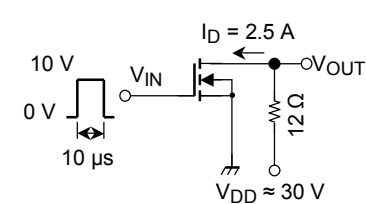
Weight: 3.9 g (typ.)

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance of channel to ambient (4 devices operation, $T_a = 25^\circ\text{C}$)	$\Sigma R_{th} (ch-a)$	28.4	$^\circ\text{C/W}$
Thermal resistance of channel to case (4 devices operation, $T_c = 25^\circ\text{C}$)	$\Sigma R_{th} (ch-c)$	4.46	$^\circ\text{C/W}$
Maximum lead temperature for soldering purposes (3.2 mm from case for 10 s)	T_L	260	$^\circ\text{C}$

This Transistor is an Electrostatic Sensitive Device. Please Handle with Caution.

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
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$	3.0	5.0	—	S
Drain-source ON resistance		$R_{DS(ON)}$	$I_D = 2.5\text{ A}, V_{GS} = 4\text{ V}$	—	0.21	0.31	Ω
			$I_D = 2.5\text{ A}, V_{GS} = 10\text{ V}$	—	0.12	0.16	
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	370	—	μF
Reverse transfer capacitance		C_{rss}		—	60	—	μF
Output capacitance		C_{oss}		—	180	—	μF
Switching time	Rise time	t_r		—	18	—	ns
	Turn-on time	t_{on}		—	25	—	
	Fall time	t_f		—	15	—	
	Turn-off time	t_{off}		—	170	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$I_D = 5\text{ A}, V_{GS} = 10\text{ V}, V_{DD} = 48\text{ V}$	—	12	—	nC
Gate-source charge		Q_{gs}		—	8	—	nC
Gate-drain ("miller") charge		Q_{gd}		—	4	—	nC

Source-Drain Diode Rating and Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	I_{DR}	—	—	—	5	A
Peak 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

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Maximum forward current	I_{FM}	—	—	—	5	A
Reverse current	I_R	$V_R = 120\text{ V}$	—	—	0.4	μA
Reverse voltage	V_R	$I_R = 100\ \mu\text{A}$	120	—	—	V
Forward voltage	V_F	$I_F = 1\ \text{A}$	—	—	1.8	V

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