

TOSHIBA Power MOS FET Module Silicon N Channel MOS Type (Four L²-π-MOSV in One)**MP4410**

High Power, High Speed Switching Applications

Hammer Drive, Pulse Motor Drive and Inductive Load
Switching

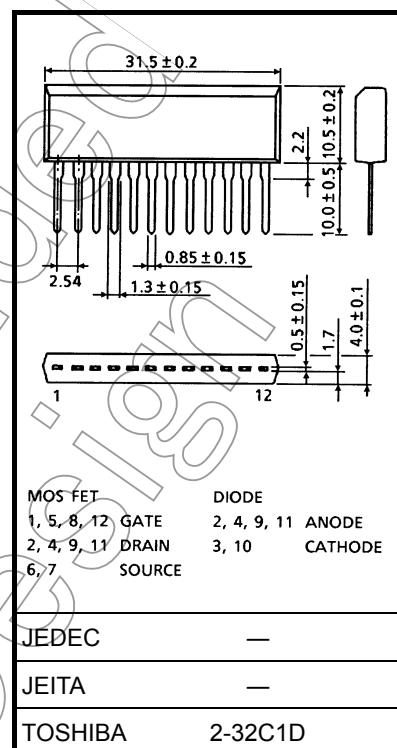
- 4-V gate drivability
- Small package by full molding (SIP 12 pin)
- High drain power dissipation (4-device operation)
: $P_T = 28$ W ($T_c = 25^\circ\text{C}$)
- Low drain-source ON resistance: $R_{DS(\text{ON})} = 0.12 \Omega$ (typ.)
- Low leakage current: $I_{GSS} = \pm 10 \mu\text{A}$ (max) ($V_{GS} = \pm 16$ V)
 $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 60$ V)
- Enhancement-mode: $V_{th} = 0.8$ to 2.0 V ($I_D = 1$ mA)

Absolute 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-device operation)	P_T	4.4	W
		28	
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

Industrial Applications

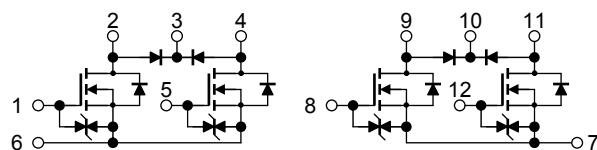
Unit: mm



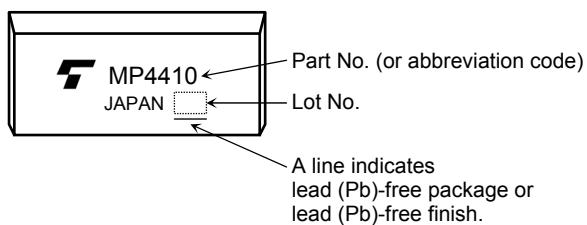
Weight: 3.9 g (typ.)

Note: 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.).

Array Configuration

Marking



Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance of channel to ambient (4-device operation, $T_a = 25^\circ\text{C}$)	$\Sigma R_{\text{th}} (\text{ch-a})$	28.4	$^\circ\text{C/W}$
Thermal resistance of channel to case (4-device operation, $T_c = 25^\circ\text{C}$)	$\Sigma R_{\text{th}} (\text{ch-c})$	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	$R_{DS (\text{ON})}$	$I_D = 2.5\text{ A}$, $V_{GS} = 4\text{ V}$	—	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	—	pF
Reverse transfer capacitance	C_{rss}		—	60	—	pF
Output capacitance	C_{oss}		—	180	—	pF
Switching time	Rise time	t_r	 V_{IN} : $t_r, t_f < 5\text{ ns}$, duty cycle $\leq 1\%$	—	18	—
	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 (Ta = 25°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

Not Recommended for New Design

recommended design

RESTRICTIONS ON PRODUCT USE

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