

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°C)
- Low drain-source ON resistance: R_{DS (ON)} = 0.12 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)

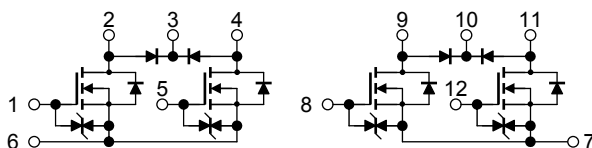
Absolute Maximum Ratings (Ta = 25°C)

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}	20	A
Drain power dissipation (1-device operation)	P _D	2.2	W
Drain power dissipation (4-device operation)	T _a = 25°C	4.4	W
	T _c = 25°C	28	
Channel temperature	T _{ch}	150	°C
Storage temperature range	T _{stg}	-55 to 150	°C

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.

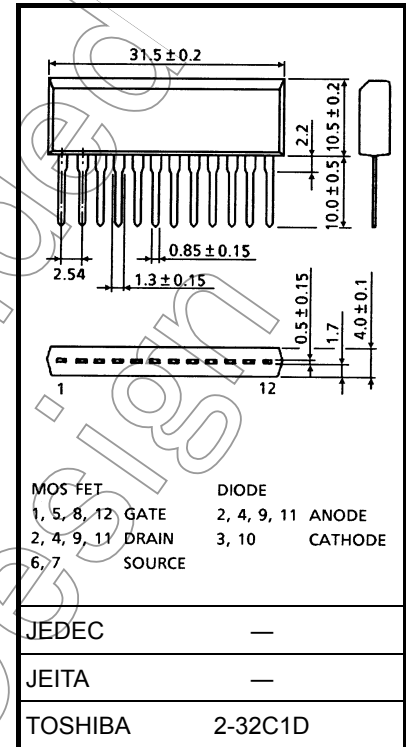
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Array Configuration



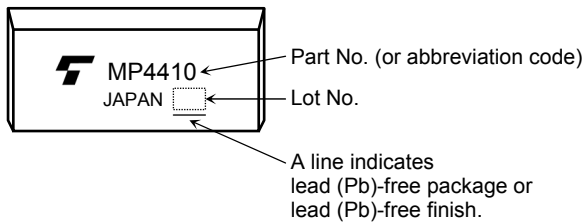
Industrial Applications

Unit: mm



Weight: 3.9 g (typ.)

Marking



Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance of channel to ambient (4-device 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-device 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	—	pF
Reverse transfer capacitance	C_{rss}		—	60	—	pF
Output capacitance	C_{oss}		—	180	—	pF
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 (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

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