TOSHIBA Power MOS FET Module Silicon N Channel MOS Type (Four L^2-π-MOSV in One)

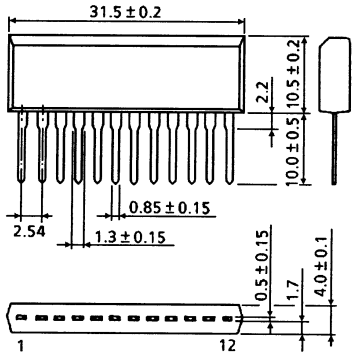
MP4410

Industrial Applications

High Power, High Speed Switching Applications

Hammer Drive, Pulse Motor Drive and Inductive Load Switching

Unit: mm



MOS FET		DIODE	
1, 5, 8, 12	GATE	2, 4, 9, 11	ANODE
2, 4, 9, 11	DRAIN	3, 10	CATHODE
6, 7	SOURCE		

JEDEC	—
JEITA	—
TOSHIBA	2-32C1D

Weight: 3.9 g (typ.)

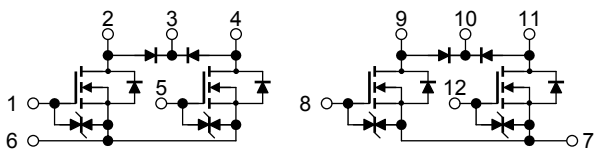
- 4-V gate drivability
- Small package by full molding (SIP 12 pin)
- High drain power dissipation (4-device operation)
  : P_T = 28 W (T_c = 25°C)
- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 0.12 Ω (typ.)
- Low leakage current: I_{GSS} = ±10 μA (max) (V_{GS} = ±16 V)
  I_{DSS} = 100 μA (max)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

Absolute Maximum Ratings (Ta = 25°C)

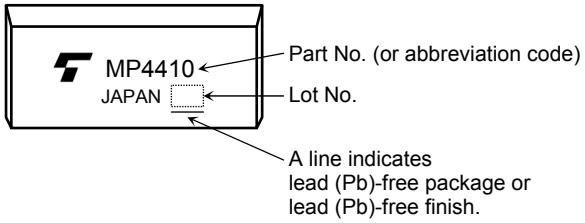
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	60	V
Gate-source voltage		V_{GSS}	±20	V
Drain current		I_D	5	A
Peak drain current		I_{DP}	20	A
Drain power dissipation (1-device operation)		P_D	2.2	W
Drain power dissipation (4-device operation)	Ta = 25°C	P_T	4.4	W
	Tc = 25°C		28	
Channel 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



Marking

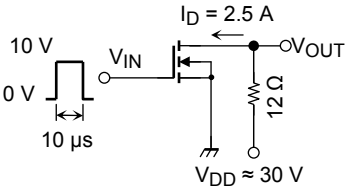


Thermal Characteristics

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

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

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut-off current		I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	60	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	0.8	—	2.0	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 2.5 A	3.0	5.0	—	S
Drain-source ON resistance		$R_{DS\ (ON)}$	I_D = 2.5 A, V_{GS} = 4 V	—	0.21	0.31	Ω
			I_D = 2.5 A, V_{GS} = 10 V	—	0.12	0.16	
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 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}	V_{IN}: t_r, t_f < 5 ns, duty cycle ≤ 1%	—	170	—	
Total gate charge (gate-source plus gate-drain)		Q_g	I_D = 5 A, V_{GS} = 10 V, V_{DD} = 48 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 A, V_{GS} = 0 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 V	—	—	0.4	μA
Reverse voltage	V_R	I_R = 100 μA	120	—	—	V
Forward voltage	V_F	I_F = 1 A	—	—	1.8	V

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20070701-EN

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