TOSHIBA IGBT Module Silicon N Channel IGBT

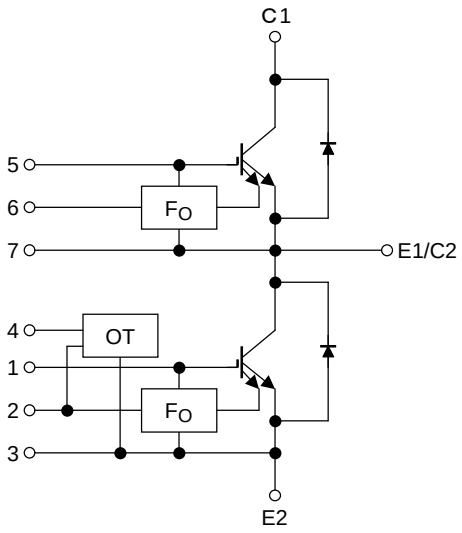
MG300Q2YS60A(1200V/300A 2in1)

High Power Switching Applications

Motor Control Applications

- Integrates a complete half bridge power circuit and fault-signal output circuit in one package. (short circuit and over temperature)
- The electrodes are isolated from case.
- Low thermal resistance
- $V_{CE\ (sat)}$ = 2.4 V (typ.)

Equivalent Circuit

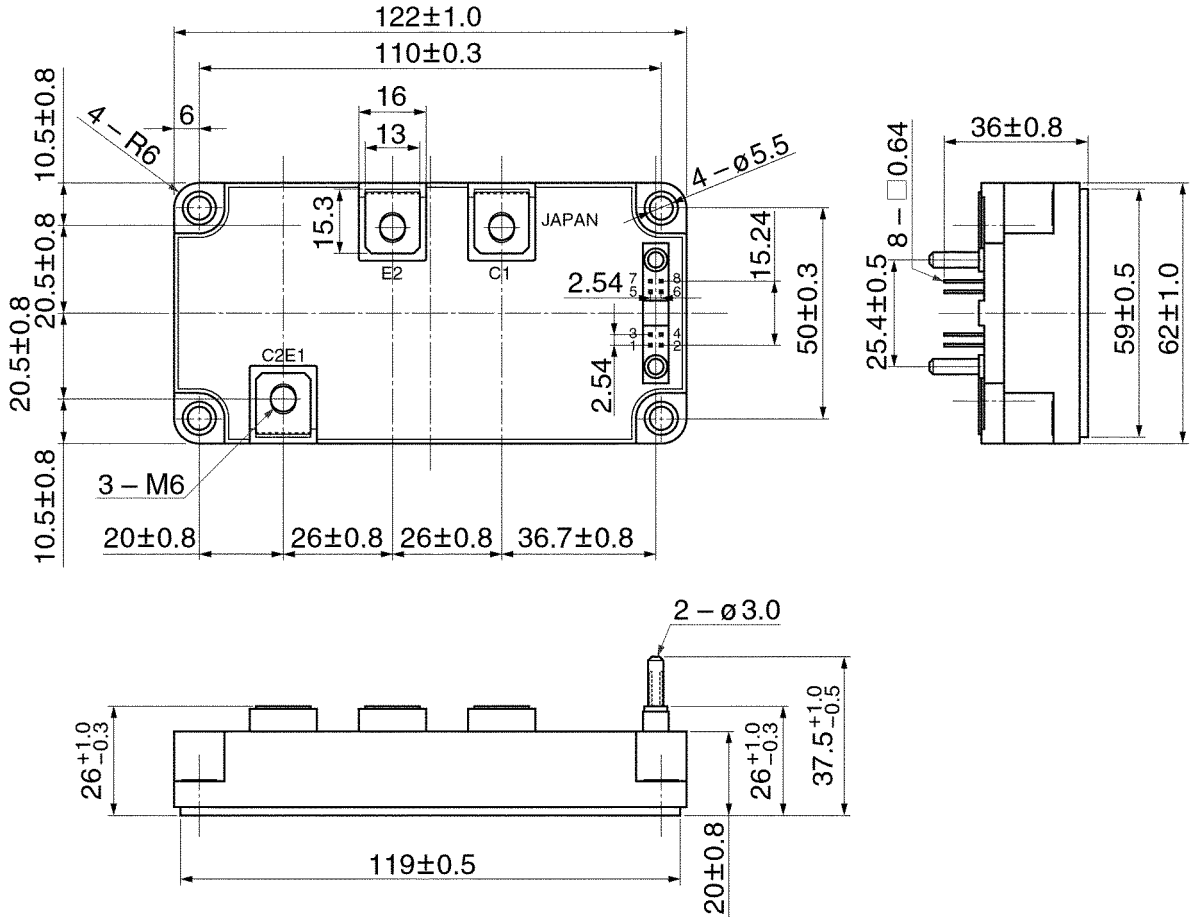


Signal terminal

1.	G (L)	2.	F_O (L)	3.	E (L)	4.	V_D
5.	G (H)	6.	F_O (H)	7.	E (H)	8.	Open

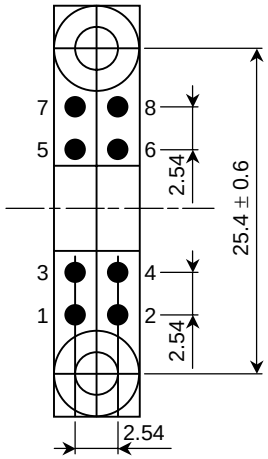
Package Dimensions: 2-123C1B

Unit: mm



1.	G (L)	2.	F_O (L)	3.	E (L)	4.	V_D
5.	G (H)	6.	F_O (H)	7.	E (H)	8.	Open

Signal Terminal Layout



1.	G (L)	2.	F_O (L)	3.	E (L)	4.	V_D
5.	G (H)	6.	F_O (H)	7.	E (H)	8.	Open

Weight: 375 g

Maximum Ratings (Ta = 25°C)

Stage	Characteristics		Symbol	Rating	Unit
Inverter	Collector-emitter voltage		V_{CES}	1200	V
	Gate-emitter voltage		V_{GES}	±20	V
	Collector current	DC	I_C	300	A
		1 ms	I_{CP}	600	
	Forward current	DC	I_F	300	A
		1 ms	I_{FM}	600	
	Collector power dissipation (Tc = 25°C)		P_C	2800	W
Control	Control voltage (OT)		V_D	20	V
	Fault input voltage		VF_O	20	V
	Fault input current		IF_O	20	mA
Module	Junction temperature		T_j	150	°C
	Storage temperature range		T_{stg}	−40~125	°C
	Operation temperature range		T_{ope}	−20~100	°C
	Isolation voltage		V_{isol}	2500 (AC 1 min)	V
	Screw torque		—	3 (M5)	N·m

Electrical Characteristics (T_j = 25°C)

1. Inverter Stage

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±20 V, V_{CE} = 0		—	—	+3/−4	mA
			V_{GE} = +10 V, V_{CE} = 0		—	—	100	nA
Collector cut-off current		I_{CES}	V_{CE} = 1200 V, V_{GE} = 0		—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	V_{CE} = 5 V, I_C = 300 mA		6.0	7.0	8.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	V_{GE} = 15 V, I_C = 300 A	Tj = 25°C	—	2.4	2.8	V
				Tj = 125°C	—	—	3.2	
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz		—	21000	—	pF
Switching time	Turn-on delay time	$t_{d\ (on)}$	V_{CC} = 600 V, I_C = 300 A V_{GE} = ±15 V, R_G = 6.8 Ω (Note 1)		0.10	—	1.00	μs
	Turn-off time	t_{off}			—	—	2.00	
	Fall time	t_f			—	—	0.50	
Reverse recovery time		t_{rr}			—	—	0.50	
Forward voltage		V_F	I_F = 300 A		—	2.1	2.6	V

Note 1: Switching time test circuit & timing chart

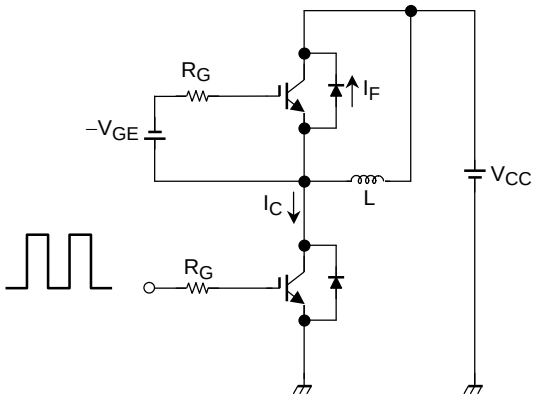
2. Control (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Fault output current	OC	V_{GE} = 15 V	360	—	—	A
Over temperature	OT	—	100	—	125	°C
Fault output delay time	$t_{d\ (Fo)}$	V_{CC} = 600 V, V_{GE} = ±15 V	—	—	8	μs

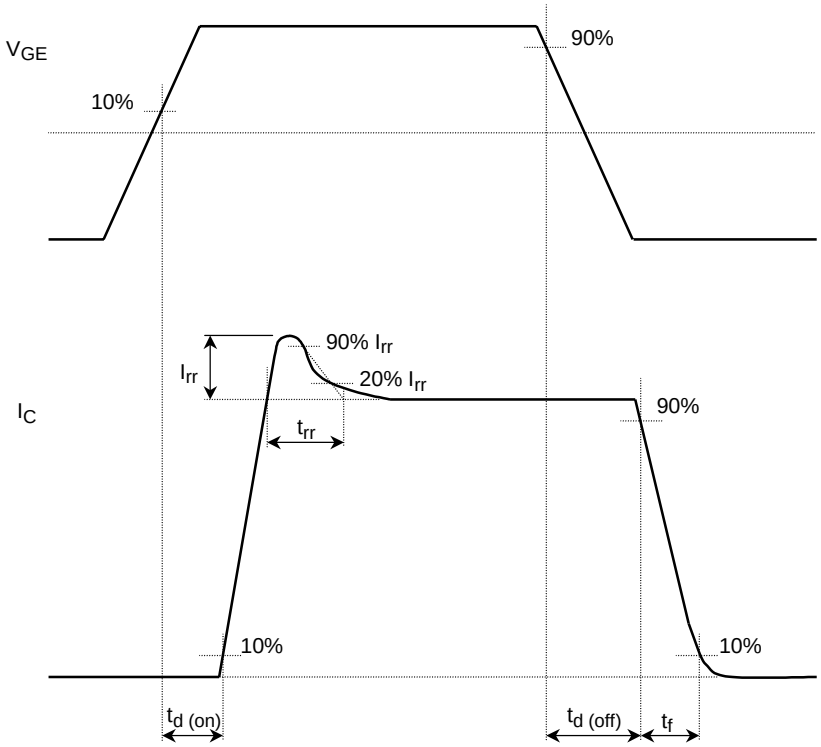
3. Module (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Junction to case thermal resistance	$R_{th\ (j\text{-}c)}$	Inverter IGBT stage	—	—	0.044	°C/W
		Inverter FRD stage	—	—	0.068	
Case to fin thermal resistance	$R_{th\ (c\text{-}f)}$	With silicon compound	—	0.013	—	°C/W

Switching Time Test Circuit



Timing Chart



Remark

<Short circuit capability condition>

- Short circuit capability is 6 μs after fault output signal.
  Please keep following condition to use fault output signal.
  - $V_{CC} \leqq 750$ V
  - $14.8 \text{ V} \leqq V_{GE} \leqq 17.0$ V
  - $R_G \geqq 6.8\ \Omega$
  - $T_j \leqq 125°C$

<Gate voltage>

- To use this product, V_{GE} must be provided higher than 14.8 V.
  In case V_{GE} is less than 14.8 V, fault signal F_O may not be output even under error conditions.

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