

TOSHIBA INTELLIGENT POWER MODULE SILICON N CHANNEL IGBT

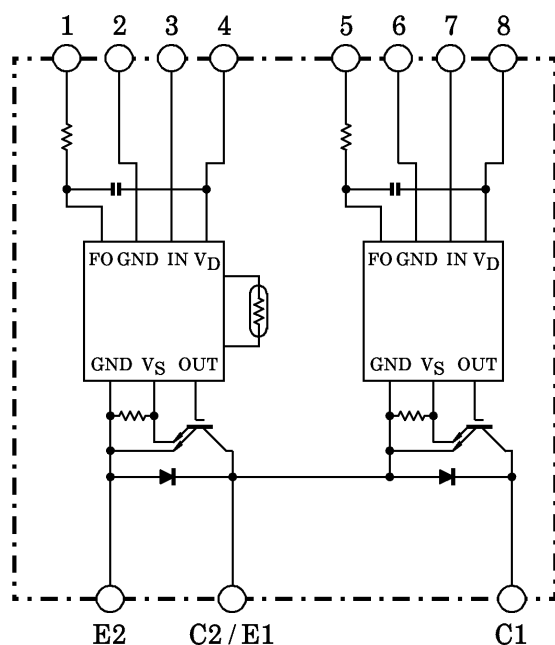
MIG200Q2CSA0X (1200V / 200A 2in1)

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter Power Circuits & Control Circuits (IGBT drive unit, Protection units for Short-Current, Over-Current, Under-Voltage & Over Temperature) in One Package.
- The Electrodes are Isolated from Case.
- $V_{CE(sat)} = 2.2\text{ V (Typ.)}$

EQUIVALENT CIRCUIT

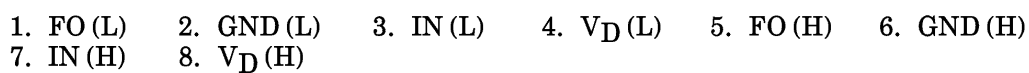


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|-----------|------------|-----------|--------------|
| 1. FO (L) | 2. GND (L) | 3. IN (L) | 4. V_D (L) |
| 5. FO (H) | 6. GND (H) | 7. IN (H) | 8. V_D (H) |

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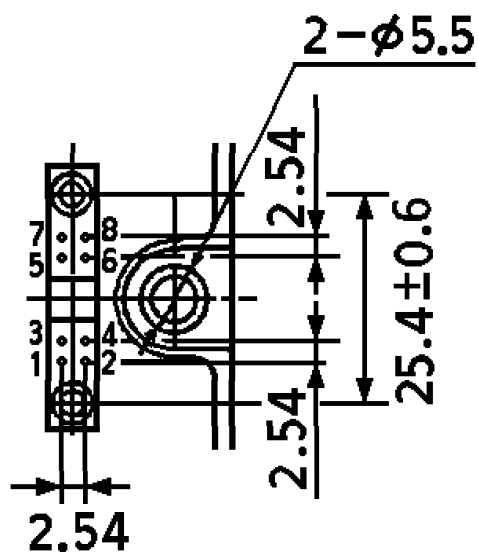
Unit : mm



Weight : 279 g (Typ.)

SIGNAL TERMINAL LAYOUT

Unit : mm



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MAXIMUM RATINGS

STAGE	CHARACTERISTIC	CONDITION	SYMBOL	RATINGS	UNIT
Inverter	Supply Voltage	P-N Power Terminal	V_{CC}	900	V
	Collector-Emitter Voltage		V_{CES}	1200	V
	Collector Current	$T_c = 25^\circ\text{C}$, DC	I_C	200	A
	Forward Current	$T_c = 25^\circ\text{C}$, DC	I_F	200	A
	Collector Power Dissipation	$T_c = 25^\circ\text{C}$	P_C	1250	W
	Junction Temperature		T_j	150	$^\circ\text{C}$
Control	Control Supply Voltage	V_D -GND Terminal	V_D	20	V
	Input Voltage	IN-GND Terminal	V_{IN}	20	V
	Fault Output Voltage	FO-GND Terminal	V_{FO}	20	V
	Fault Output Current	FO Sink Current	I_{FO}	14	mA
Module	Operating Temperature		T_c	$-20 \sim +100$	$^\circ\text{C}$
	Storage Temperature		T_{stg}	$-40 \sim +125$	$^\circ\text{C}$
	Isolation Voltage	AC 1 minute	V_{ISO}	2500	V
	Screw Torque	M5	—	3	Nm

ELECTRICAL CHARACTERISTICS

a. Inverter stage ($T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-Off Current	I_{CEX}	$V_{CEX} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$	—	1	mA
			$T_j = 125^\circ\text{C}$	—	10	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{ V}$, $I_C = 200\text{ A}$ $V_{IN} = 15\text{ V} \rightarrow 0\text{ V}$	$T_j = 25^\circ\text{C}$	—	2.2	V
			$T_j = 125^\circ\text{C}$	—	3.0	
Forward Voltage	V_F	$I_F = 200\text{ A}$	—	2.5	3.1	V
Switching Time	t_{on}	$V_{CC} = 600\text{ V}$, $I_C = 200\text{ A}$ $V_D = 15\text{ V}$, $V_{IN} = 15\text{ V} \leftrightarrow 0\text{ V}$ Inductive load (Note 1)	—	1.5	2.5	μs
	$t_{c(on)}$		—	1.0	1.5	
	t_{rr}		—	0.4	0.6	
	t_{off}		—	2.0	3.0	
	$t_{c(off)}$		—	0.3	0.7	

b. Control stage ($T_j = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Circuit Current	High Side	I_D (H)	$V_D = 15\text{ V}$	—	11	15	mA
	Low Side	I_D (L)		—	21	25	
Input On Signal Voltage		V_{IN} (on)		1.4	1.6	1.8	V
Input Off Signal Voltage		V_{IN} (off)		2.2	2.5	2.8	
Fault Output Current	Protection	I_{FO} (on)	$V_D = 15\text{ V}$	8	10	12	mA
	Normal	I_{FO} (off)		—	—	0.1	
Over Current Protection Trip Level		OC	$V_D = 15\text{ V}, T_j \leq 125^\circ\text{C}$	320	—	—	A
Short Circuit Protection Trip Level		SC	$V_D = 15\text{ V}, T_j \leq 125^\circ\text{C}$	400	—	—	A
Over Current Cut-Off Time		t_{off} (OC)	$V_D = 15\text{ V}$	—	5	—	μs
Over Temperature Protection	Trip Level	OT	Case temperature	110	118	125	$^\circ\text{C}$
	Reset Level	OTr		—	98	—	
Control Supply Under Voltage Protection	Trip Level	UV		11.0	12.0	12.5	V
	Reset Level	UVr		12.0	12.5	13.0	
Fault Output Pulse Width		t_{FO}	$V_D = 15\text{ V}$	1	2	3	ms

c. Thermal resistance ($T_c = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Junction to Case Thermal Resistance	$R_{th(j-c)}$	IGBT	—	—	0.10	$^\circ\text{C} / \text{W}$
		FRD	—	—	0.25	

(Note 1) : Switching time test circuit & timing chart

