

**TOSHIBA**

**MIG200Q2CSA0X**

TOSHIBA INTELLIGENT POWER MODULE SILICON N CHANNEL IGBT

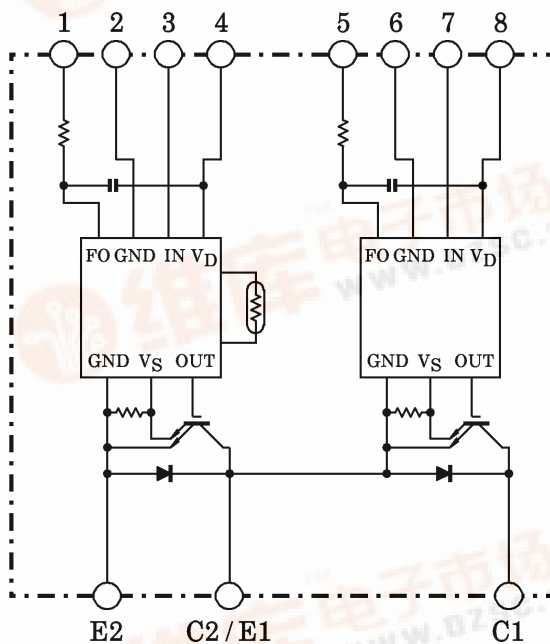
# MIG200Q2CSA0X (1200V / 200A 2in1)

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



- |           |            |           |              |
|-----------|------------|-----------|--------------|
| 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) |

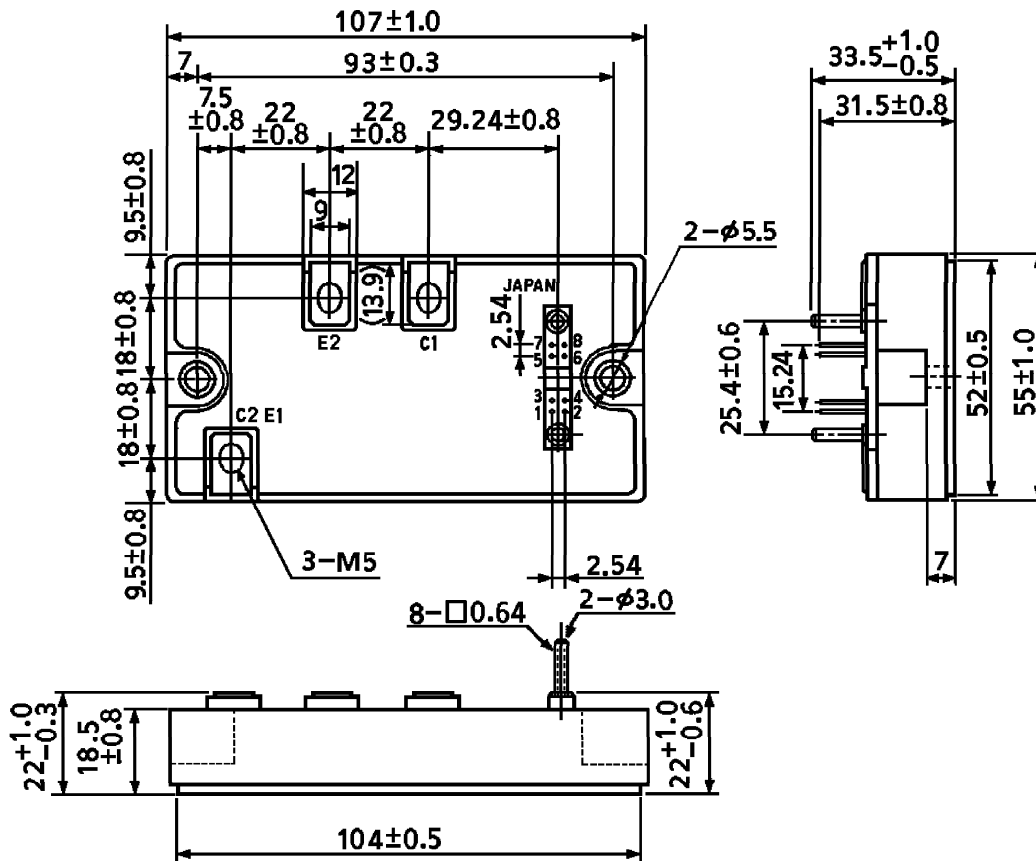
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OUTLINE: TOSHIBA 2-108H1A

Unit : mm

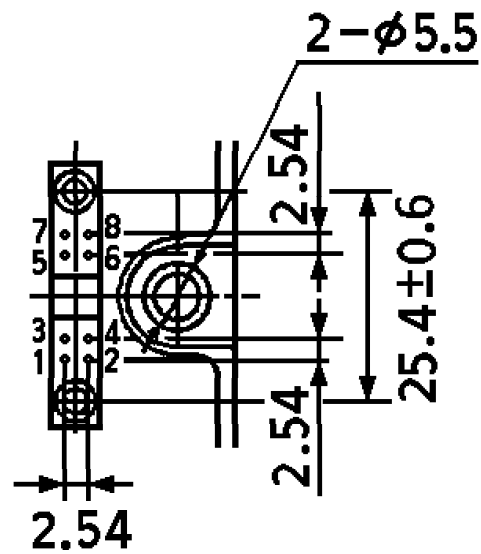


- |           |                       |           |                       |           |            |
|-----------|-----------------------|-----------|-----------------------|-----------|------------|
| 1. FO (L) | 2. GND (L)            | 3. IN (L) | 4. V <sub>D</sub> (L) | 5. FO (H) | 6. GND (H) |
| 7. IN (H) | 8. V <sub>D</sub> (H) |           |                       |           |            |

Weight : 279 g (Typ.)

## SIGNAL TERMINAL LAYOUT

Unit : mm



- |           |                       |           |                       |           |            |
|-----------|-----------------------|-----------|-----------------------|-----------|------------|
| 1. FO (L) | 2. GND (L)            | 3. IN (L) | 4. V <sub>D</sub> (L) | 5. FO (H) | 6. GND (H) |
| 7. IN (H) | 8. V <sub>D</sub> (H) |           |                       |           |            |

MAXIMUM RATINGS

STAGE	CHARACTERISTIC	CONDITION	SYMBOL	RATINGS	UNIT
Inverter	Supply Voltage	P-N Power Terminal	V <sub>CC</sub>	900	V
	Collector-Emitter Voltage		V <sub>CES</sub>	1200	V
	Collector Current	T <sub>c</sub> = 25°C, DC	I <sub>C</sub>	200	A
	Forward Current	T <sub>c</sub> = 25°C, DC	I <sub>F</sub>	200	A
	Collector Power Dissipation	T <sub>c</sub> = 25°C	P <sub>C</sub>	1250	W
	Junction Temperature		T <sub>j</sub>	150	°C
Control	Control Supply Voltage	V <sub>D</sub> -GND Terminal	V <sub>D</sub>	20	V
	Input Voltage	IN-GND Terminal	V <sub>IN</sub>	20	V
	Fault Output Voltage	FO-GND Terminal	V <sub>FO</sub>	20	V
	Fault Output Current	FO Sink Current	I <sub>FO</sub>	14	mA
Module	Operating Temperature		T <sub>c</sub>	-20~+100	°C
	Storage Temperature		T <sub>stg</sub>	-40~+125	°C
	Isolation Voltage	AC 1 minute	V <sub>ISO</sub>	2500	V
	Screw Torque	M5	—	3	Nm

ELECTRICAL CHARACTERISTICS

a. Inverter stage (T<sub>j</sub> = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Collector Cut-Off Current	I <sub>CEX</sub>	V <sub>CES</sub> = 1200 V	T <sub>j</sub> = 25°C	—	—	1	mA
			T <sub>j</sub> = 125°C	—	—	10	
Collector-Emitter Saturation Voltage	V <sub>CE (sat)</sub>	V <sub>D</sub> = 15V, I <sub>C</sub> = 200 A V <sub>IN</sub> = 15 V → 0 V	T <sub>j</sub> = 25°C	—	2.2	2.6	V
			T <sub>j</sub> = 125°C	—	—	3.0	
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 200 A	—	2.5	3.1	V	
Switching Time	t <sub>on</sub>	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 200 A V <sub>D</sub> = 15 V, V <sub>IN</sub> = 15 V ↔ 0 V Inductive load (Note 1)	—	1.5	2.5	μs	
	t <sub>c (on)</sub>		—	1.0	1.5		
	t <sub>rr</sub>		—	0.4	0.6		
	t <sub>off</sub>		—	2.0	3.0		
	t <sub>c (off)</sub>		—	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	—	$\mu\text{s}$
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

