

**TOSHIBA**

**MIG200Q101H**

TOSHIBA INTELLIGENT POWER MODULE SILICON N CHANNEL IGBT

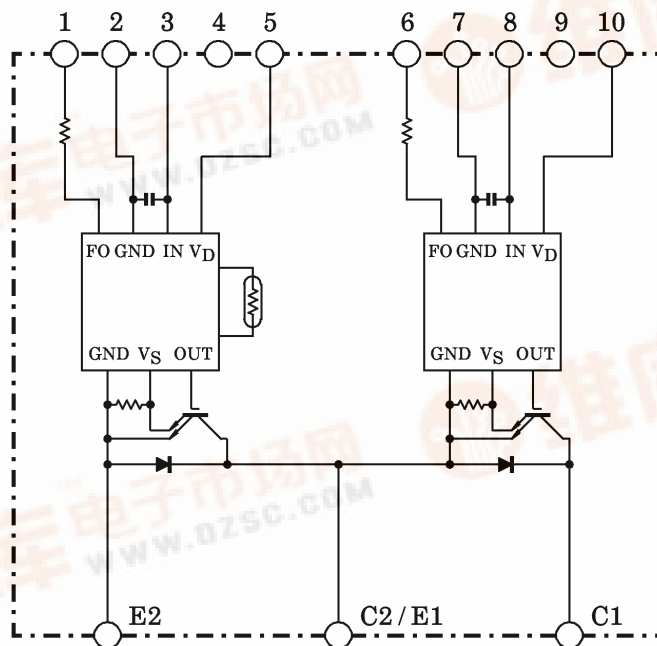
# MIG200Q101H

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter Power Circuits & Control Circuits (IGBT drive units, Protection units for Over-Current, Under-Voltage & Over-Temperature) in One Package.
- The Electrodes are Isolated from Case.
- High Speed Type IGBT :  $V_{CE(sat)} = 3.5V$  (Max.)  
 $t_{off} = 3.8\mu s$  (Max.)  
 $t_{rr} = 0.24\mu s$  (Max.)
- Outline : TOSHIBA 2-121A1A
- Weight : 510g

EQUIVALENT CIRCUIT



- |           |            |           |         |               |
|-----------|------------|-----------|---------|---------------|
| 1. FO (L) | 2. GND (L) | 3. IN (L) | 4. Open | 5. $V_D$ (L)  |
| 6. FO (H) | 7. GND (H) | 8. IN (H) | 9. Open | 10. $V_D$ (H) |

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### MAXIMUM RATINGS ( $T_j = 25^\circ\text{C}$ )

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	$T_c = 25^\circ\text{C}$	$P_C$	1600	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 (L) terminal	$V_{FO}$	20	V
	Fault Output Current	FO sink current	$I_{FO}$	14	mA
Module	Operating Temperature	—	TC	$-20 \sim +100$	$^\circ\text{C}$
	Storage Temperature Range	—	$T_{stg}$	$-40 \sim +125$	$^\circ\text{C}$
	Isolation Voltage	AC 1 minute	$V_{ISO}$	2500	V
	Screw Torque	M6	—	3	Nm

### ELECTRICAL CHARACTERISTICS ( $T_j = 25^\circ\text{C}$ )

#### a. Inverter stage

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Collector Cut-Off Current	$I_{CEX}$	$V_{CEX} = 1200\text{V}$	$T_j = 25^\circ\text{C}$	—	—	2	mA
			$T_j = 125^\circ\text{C}$	—	—	40	
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$V_D = 15\text{V}$ , $I_C = 200\text{A}$ $V_{IN} = 3\text{V} \rightarrow 0\text{V}$	$T_j = 25^\circ\text{C}$	—	2.7	3.5	V
			$T_j = 125^\circ\text{C}$	—	2.6	—	
Forward Voltage	$V_F$	$I_F = 200\text{A}$	—	2.0	2.7	V	
Switching Time	$t_{on}$	$V_{CC} = 600\text{V}$ , $I_C = 200\text{A}$ $V_D = 15\text{V}$ , $V_{IN} = 3\text{V} \leftrightarrow 0\text{V}$ Inductive load (Note 1)	0.8	1.5	2.2	$\mu\text{s}$	
	$t_c(\text{on})$		—	0.5	1.0		
	$t_{rr}$		—	0.16	0.24		
	$t_{off}$		—	3.3	3.8		
	$t_c(\text{off})$		—	0.4	0.8		

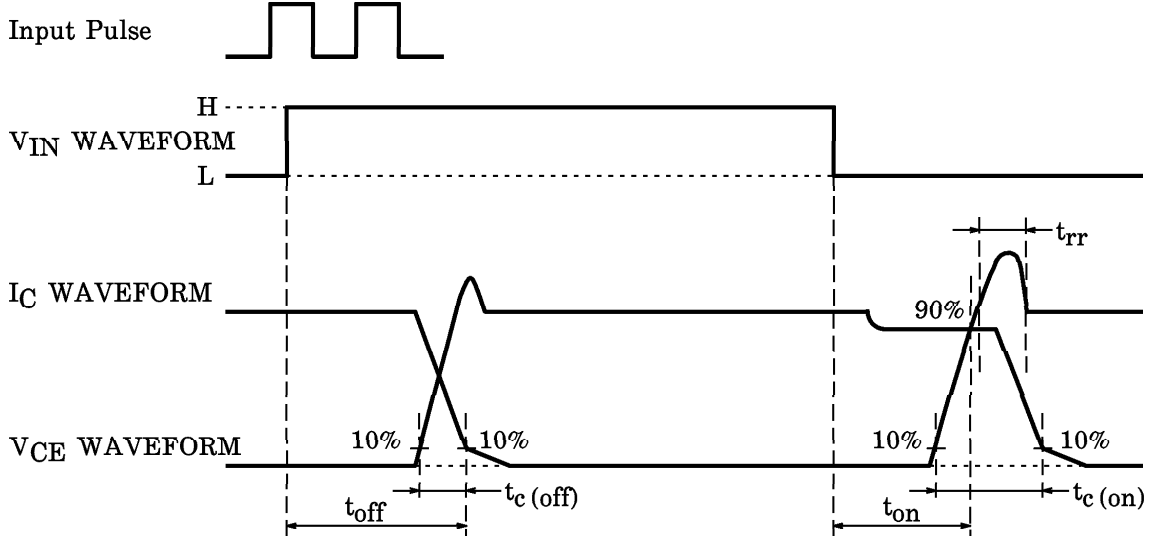
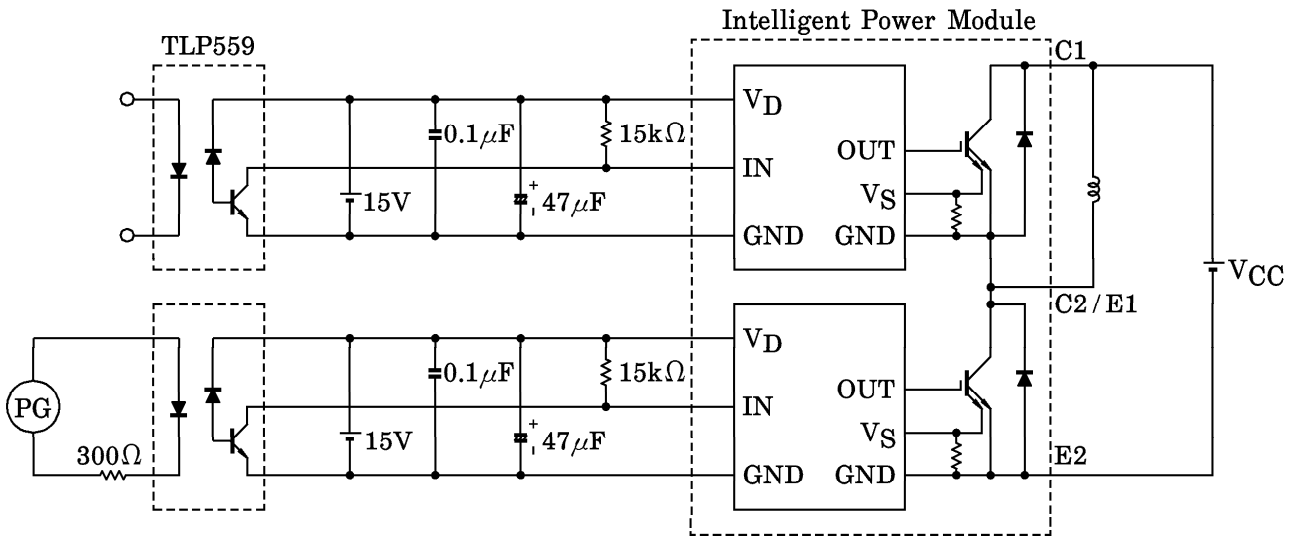
b. Control stage ( $T_j = 25^\circ\text{C}$ )

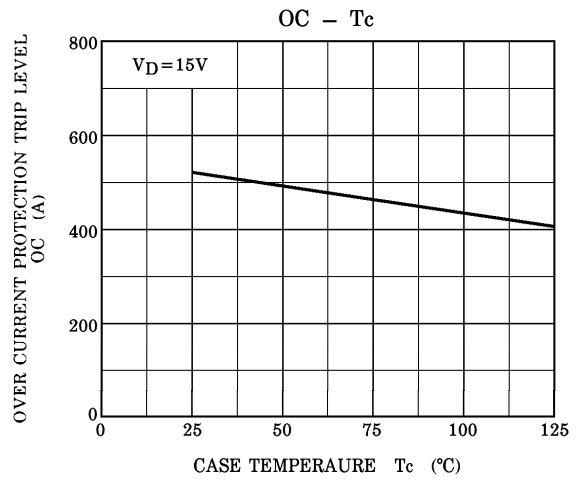
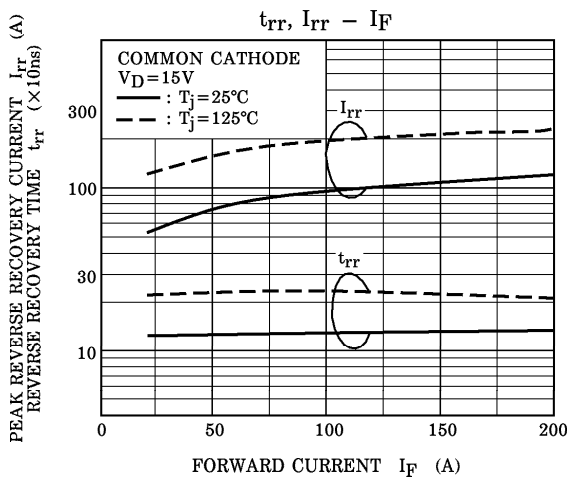
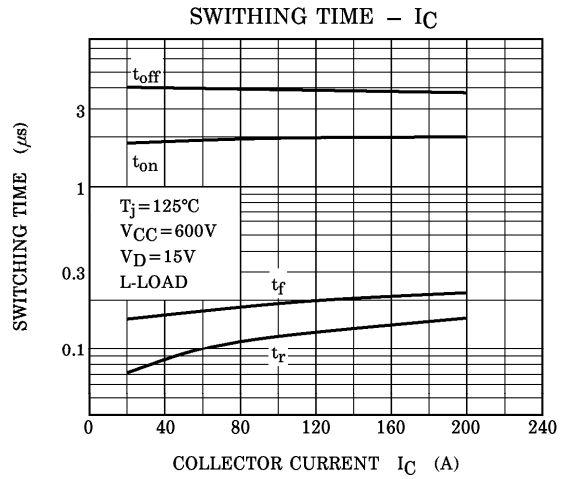
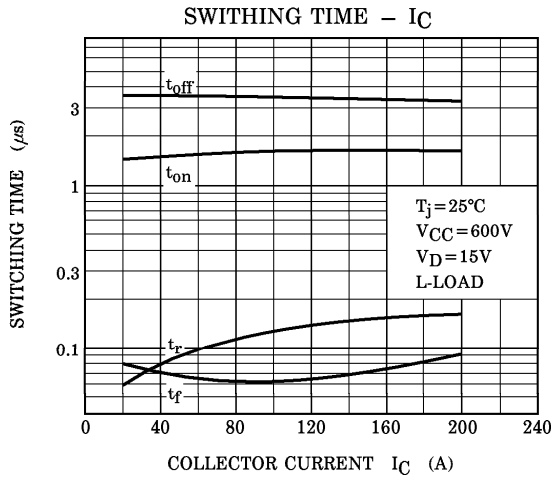
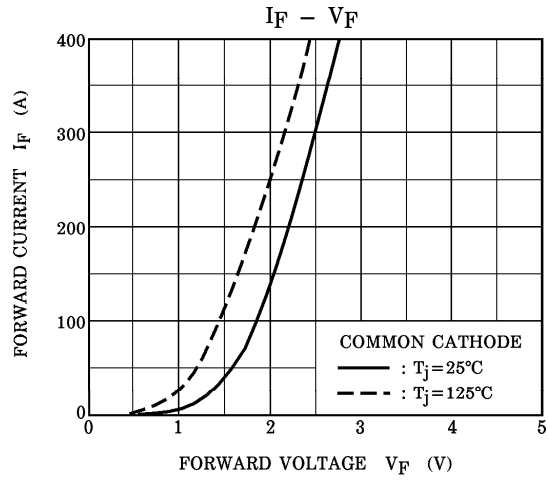
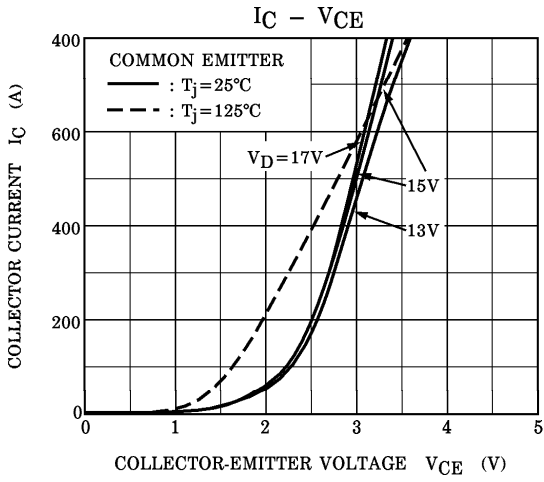
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Circuit Current		$I_D$	$V_D = 15\text{V}$	—	20	30	mA
Input On Signal Voltage		$V_{IN (on)}$	$V_D = 15\text{V}, I_C = 200\text{mA}$	0.9	1.1	1.3	V
Fault Output Current	Protection	$I_{FO (on)}$	$V_D = 15\text{V}$	8	10	12	mA
	Normal	$I_{FO (off)}$		—	—	1	
Over Current Protection Trip Level		OC	$V_D = 15\text{V}, T_j = 125^\circ\text{C}$	280	400	—	A
Short Circuit Protection Trip Level		SC	$V_D = 15\text{V}, T_j = 125^\circ\text{C}$	420	600	—	A
Over Current Cut-Off Time		$t_{off(OC)}$	$V_D = 15\text{V}$	—	10	—	$\mu\text{s}$
Over Temperature Protection	Trip Level	OT	Case temperature	111	118	125	$^\circ\text{C}$
	Reset Level	OTr		93	100	107	
Control Supply Under Voltage Protection	Trip Level	UV	—	11.3	12.0	12.7	V
	Reset Level	UVr		11.8	12.5	13.2	
Fault Output Pulse Width		$t_{FO}$	$V_D = 15\text{V}$	1	2	3	ms

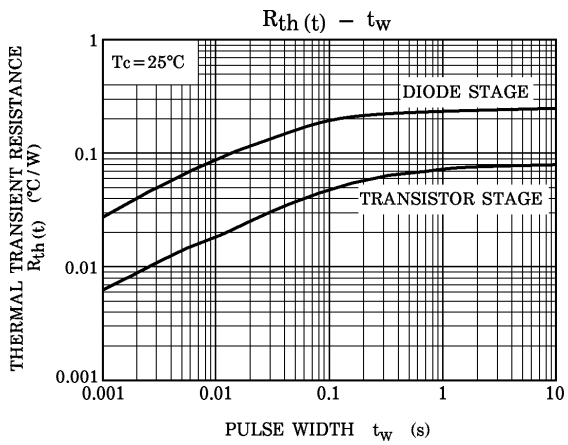
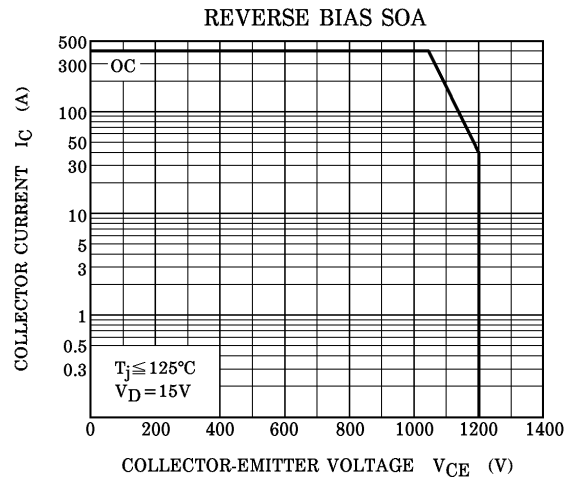
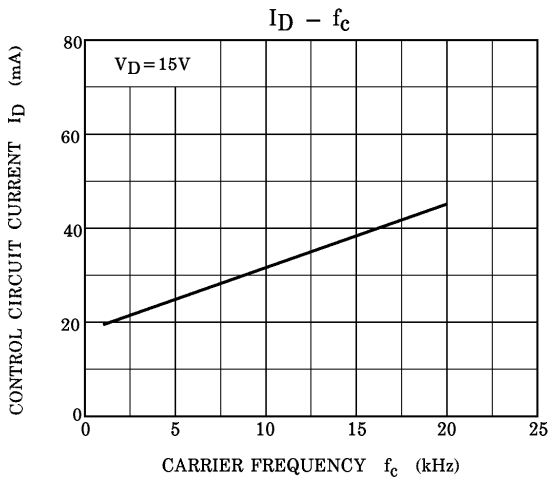
c. Thermal resistance ( $T_j = 25^\circ\text{C}$ )

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Junction to Case Thermal Resistance	$R_{th(j-c)}$	IGBT		—	—	0.078	$^\circ\text{C/W}$
		FRD		—	—	0.25	
Case to Fin Thermal Resistance		$R_{th(c-f)}$	Compound is applied	—	0.03	—	$^\circ\text{C/W}$

Note 1 : Switching time test circuit & timing chart

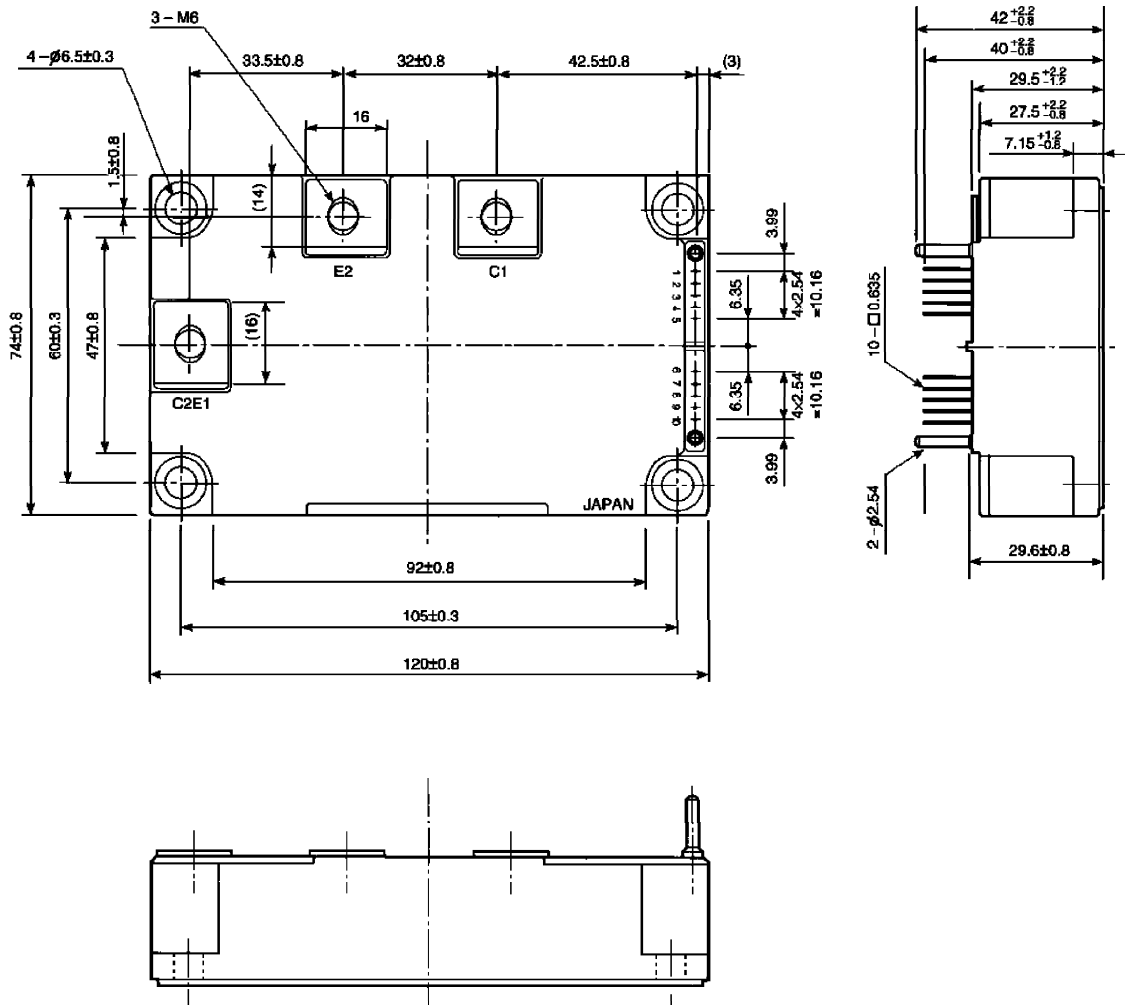






OUTLINE : TOSHIBA

Unit : mm



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