

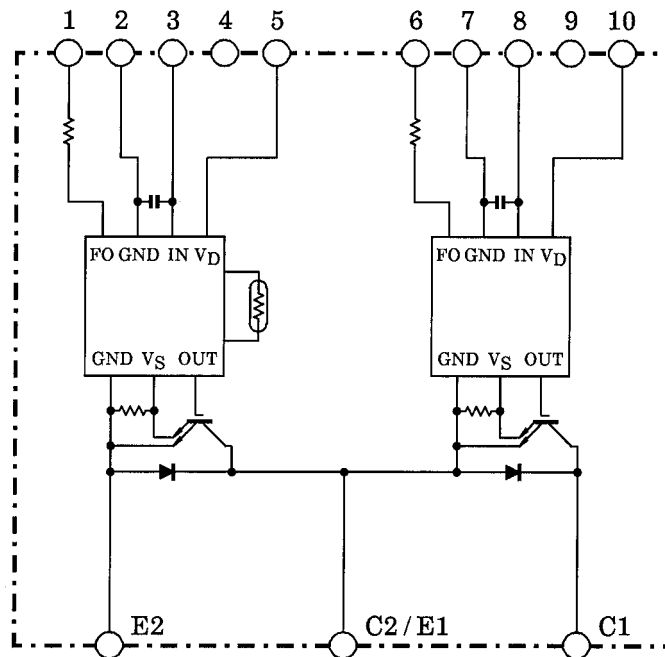
# MIG200Q101H

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) |

## 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	—	$T_C$	-20~+100	$^\circ\text{C}$
	Storage temperature range	—	$T_{stg}$	-40~+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	$V_{CE (sat)}$	$V_D = 15\text{V}$ , $I_C = 200\text{A}$ $V_{IN} = 3\text{V} \leftrightarrow 0\text{V}$	$T_j = 25^\circ\text{C}$	—	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	$\mu\text{s}$	
	$t_c (on)$		—	0.5	1.0		
	$t_{rr}$		—	0.16	0.24		
	$t_{off}$		—	3.3	3.8		
	$t_c (off)$		—	0.4	0.8		

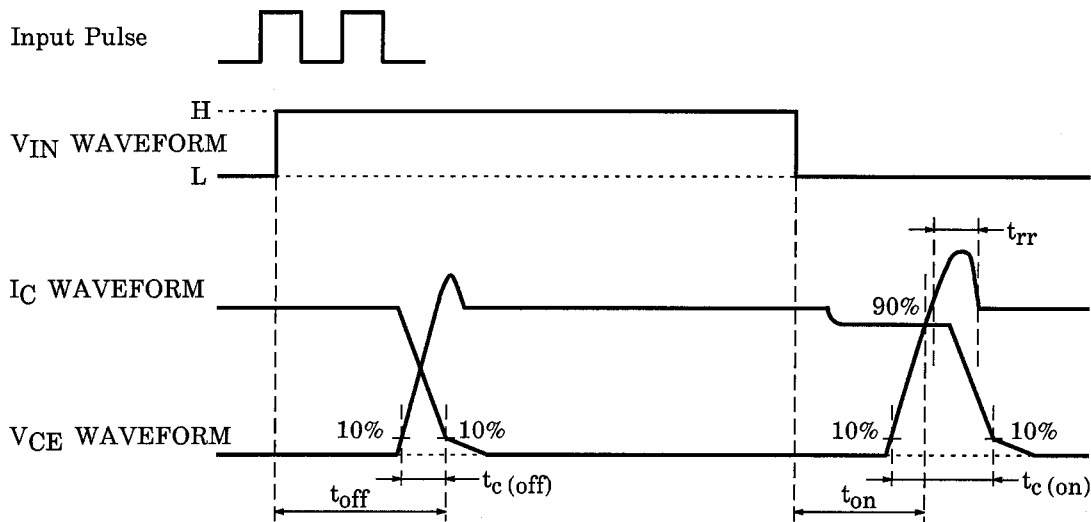
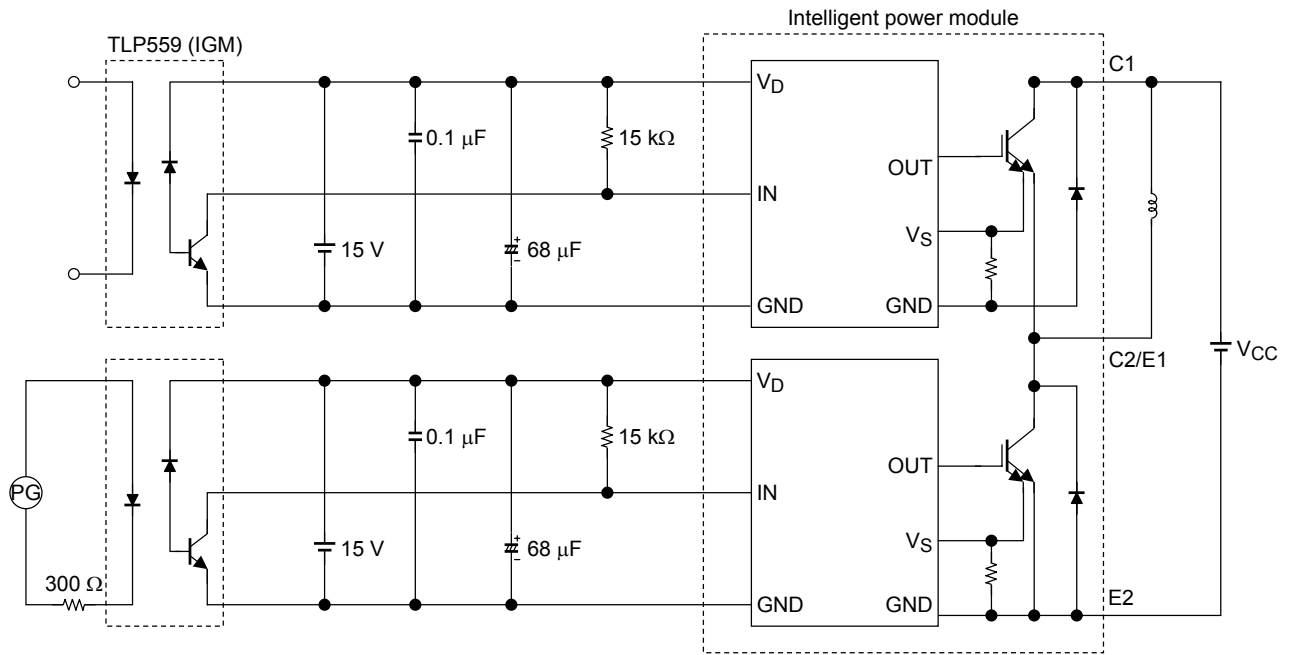
## b. Control Stage ( $T_j = 25^\circ\text{C}$ )

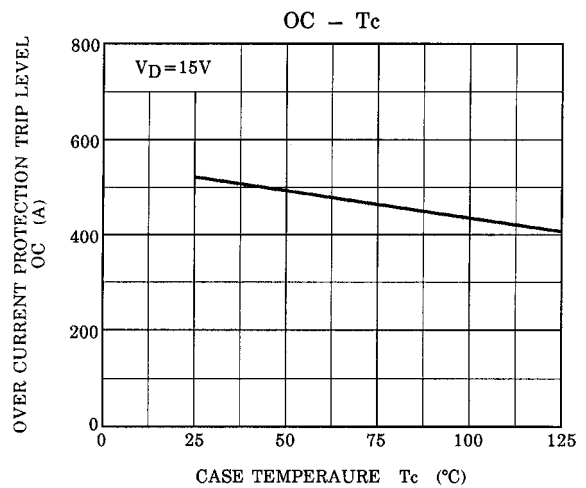
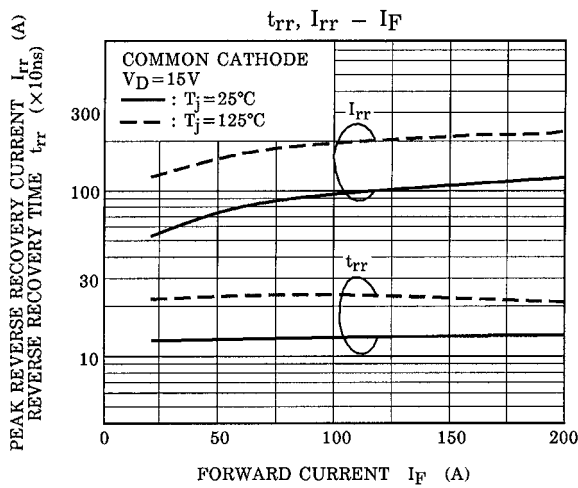
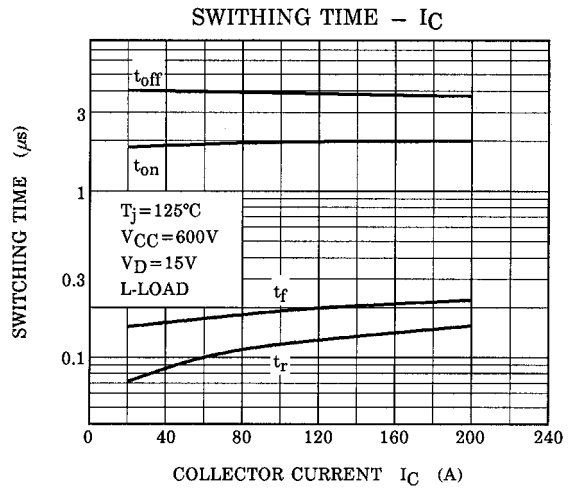
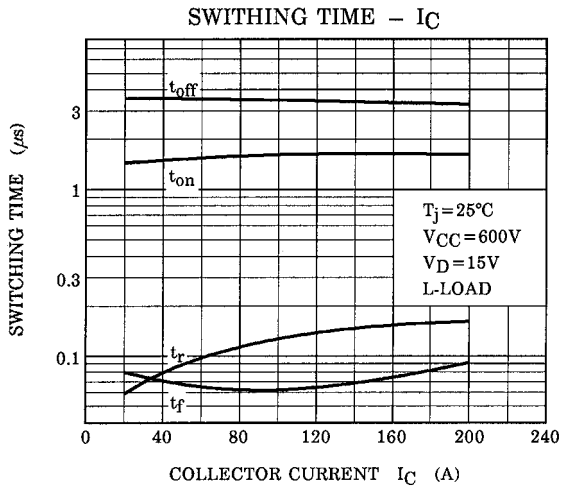
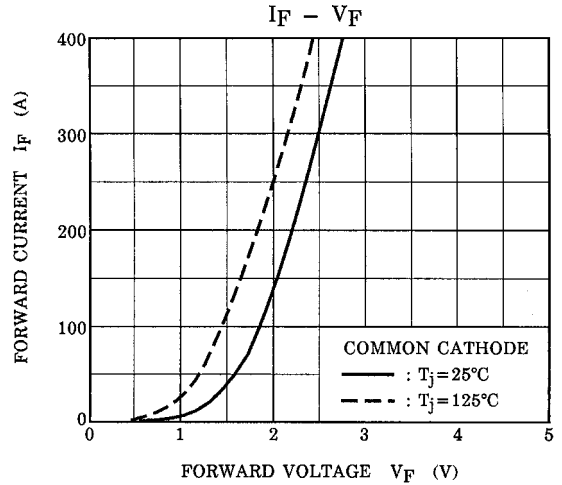
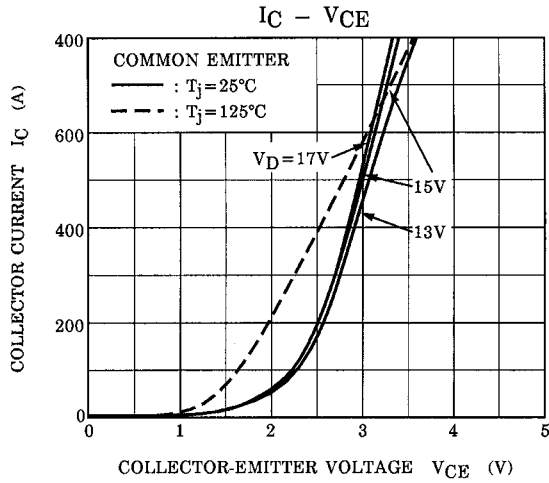
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Control circuit current	$I_D$	$V_D = 15\text{V}$	—	20	30	mA	
Input on signal voltage	$V_{IN}(\text{on})$	$V_D = 15\text{V}, I_C = 200\text{mA}$	0.9	1.1	1.3	V	
Fault output current	Protection	$V_D = 15\text{V}$	$I_{FO}(\text{on})$	8	10	12	mA
	Normal		$I_{FO}(\text{off})$	—	—	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	$t_{\text{off}}(\text{OC})$	$V_D = 15\text{V}$	—	10	—	$\mu\text{s}$	
Over temperature protection	Trip level	Case temperature	OT	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	

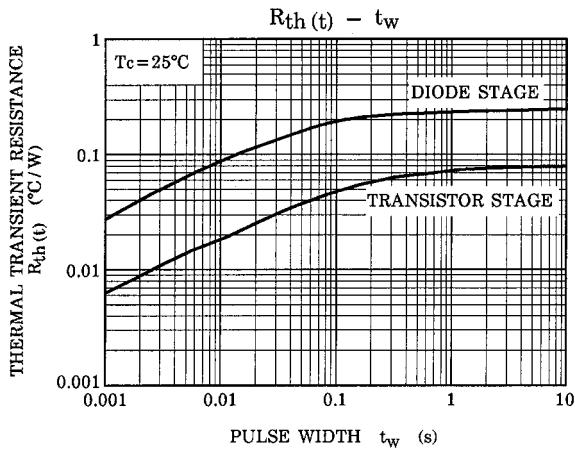
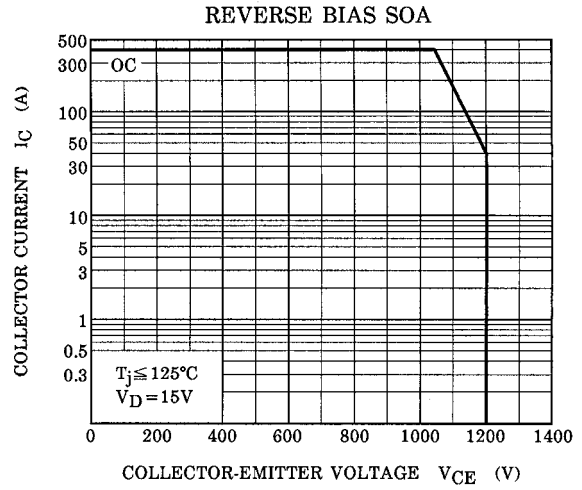
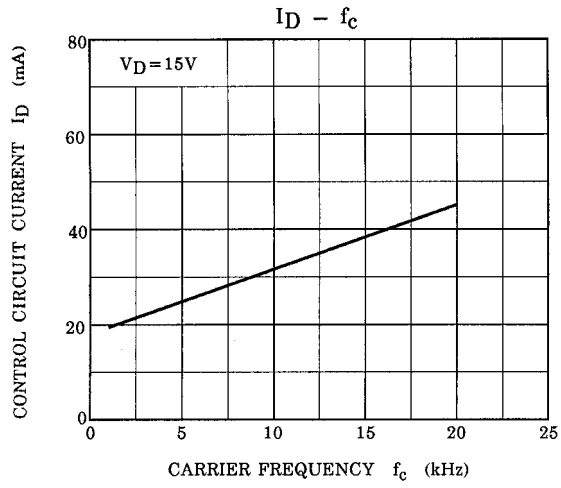
## c. Thermal Resistance ( $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Junction to case thermal resistance	$R_{th(j-c)}$	IGBT	—	—	0.078	$^\circ\text{C} / \text{W}$
		FRD	—	—	0.25	
Case to fin thermal resistance	$R_{th(c-f)}$	Compound is applied	—	0.05	—	$^\circ\text{C} / \text{W}$

Note 1: Switching time test circuit & timing chart



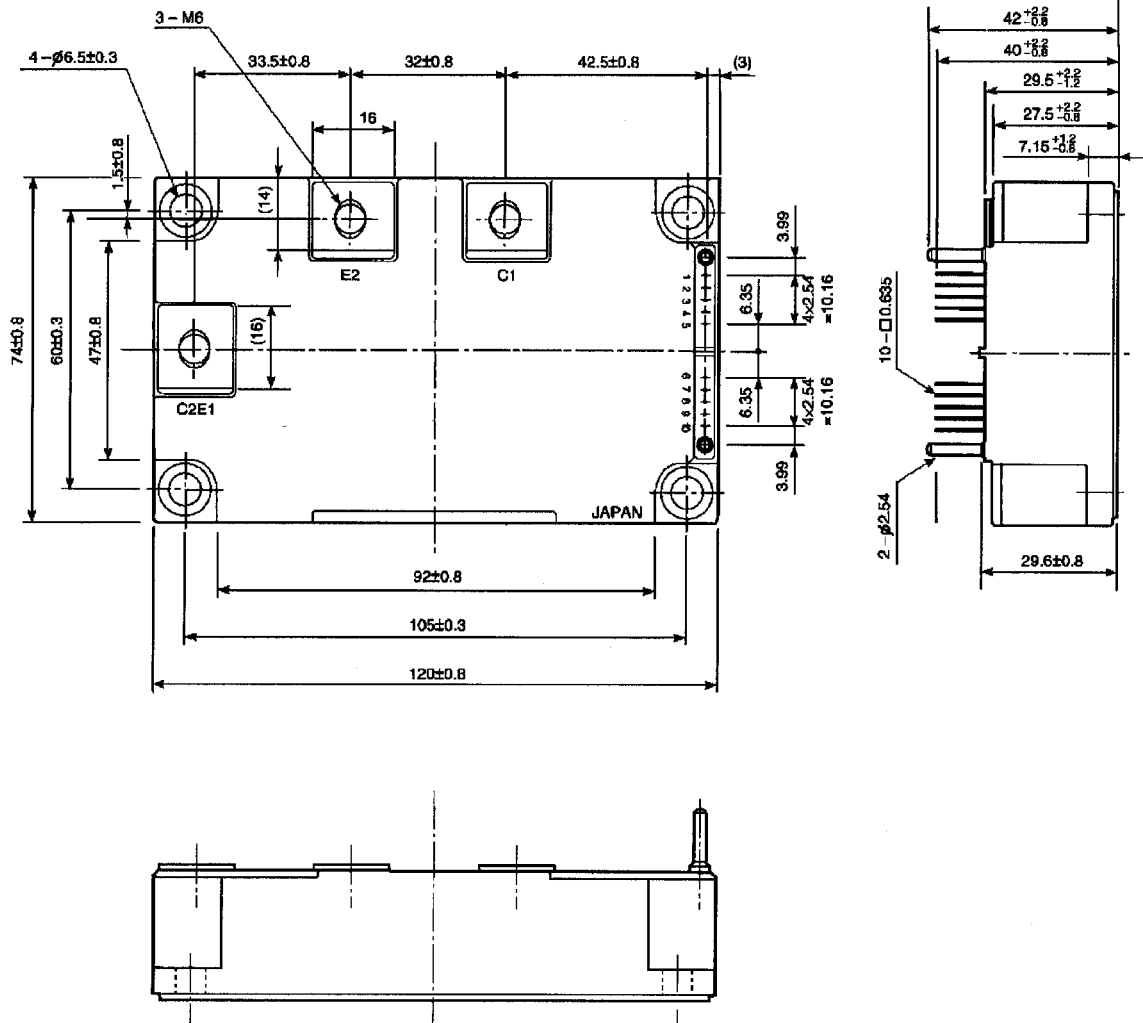




## Package Dimensions

TOSHIBA 2-121A1A

Unit: mm



- |           |            |           |         |               |
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