TOSHIBA INTELLIGENT GTR MODULE SILICON N CHANNEL IGBT

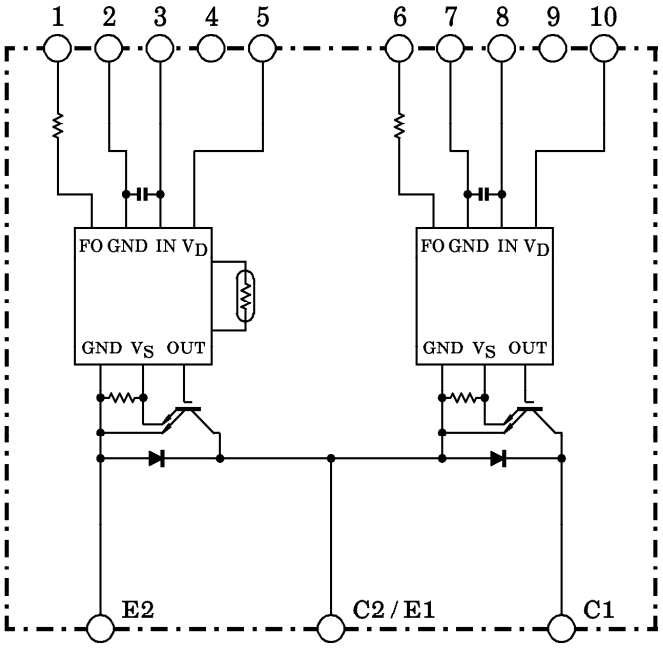
MIG300J101H

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 : $V_{CE\,(sat)}$=2.5V (Max.)
  t_{off}=2.6μs (Max.)
  t_{rr}=0.15μs (Max.)
- Outline : TOSHIBA 2-121A1A
- Weight : 520g

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)

961001EAA1

MAXIMUM RATINGS (T_j = 25°C)

STAGE	CHARACTERISTIC	CONDITION	SYMBOL	RATINGS	UNIT
Inverter	Supply Voltage	P-N power terminal	V_{CC}	450	V
	Collector-Emitter Voltage	—	V_{CES}	600	V
	Collector Current	Tc = 25°C, DC	I_C	300	A
	Forward Current	Tc = 25°C, DC	I_F	300	A
	Collector Power Dissipation	Tc = 25°C	P_C	1200	W
	Junction Temperature	—	T_j	150	°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 ~ +100	°C
	Storage Temperature Range	—	T_{stg}	−40 ~ +125	°C
	Isolation Voltage	AC 1 minute,	V_{ISO}	2500	V
	Screw Torque	M6	—	3	Nm

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

a. Inverter stage

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Collector Cut-Off Current	I_{CEX}	V_{CEX} = 600V	T_j = 25°C	—	—	2	mA
			T_j = 125°C	—	—	40	
Collector-Emitter Saturation Voltage	$V_{CE\ (sat)}$	V_D = 15V, I_C = 300A, V_{IN} = 3V→0V	T_j = 25°C	—	2.0	2.5	V
			T_j = 125°C	—	2.0	—	
Forward Voltage	V_F	I_F = 300A		—	2.1	2.7	V
Switching Time	t_{on}	V_{CC} = 300V, I_C = 300A, V_D = 15V, V_{IN} = 3V↔0V, Inductive load (Note 1)		1.1	1.8	2.5	μs
	$t_{c\ (on)}$			—	0.8	1.2	
	t_{rr}			—	0.08	0.15	
	t_{off}			—	1.9	2.6	
	$t_{c\ (off)}$			—	0.3	0.6	

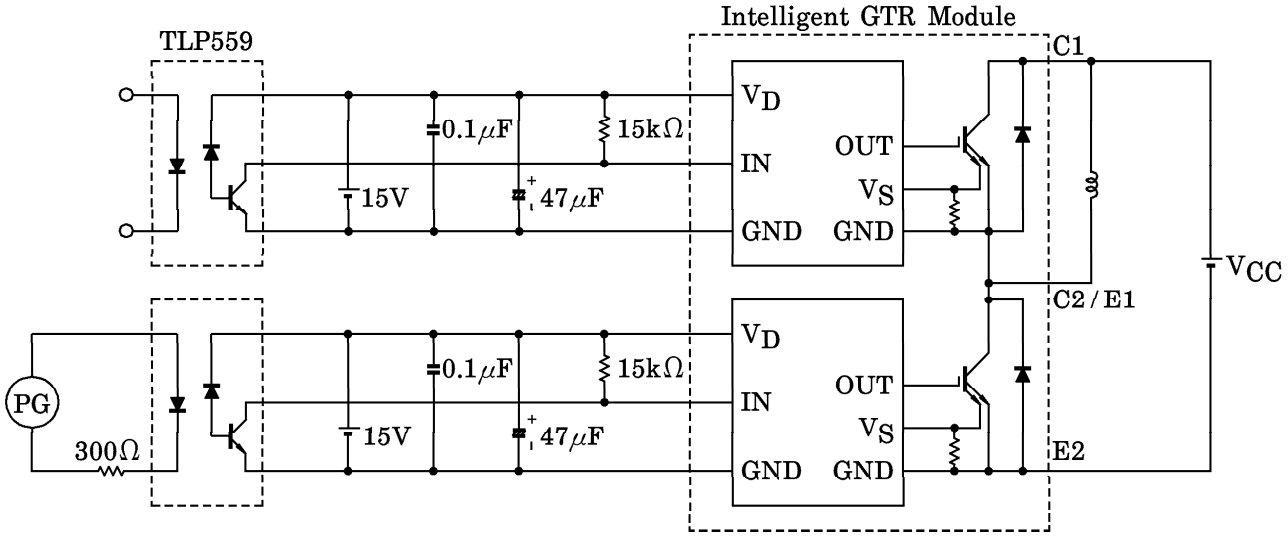
b. Control stage

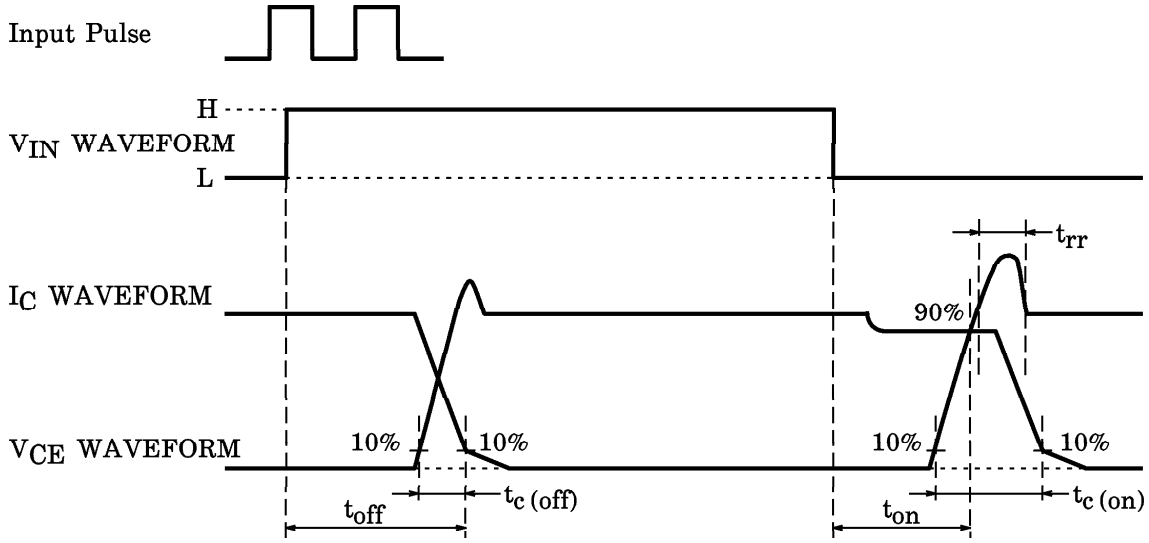
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Circuit Current High Side		I_D	V_D = 15V	—	20	30	mA
Input ON Signal Voltage		$V_{IN\,(on)}$	V_D = 15V, I_C = 300mA	0.9	1.1	1.3	V
Fault Output Current	Protection	$I_{FO\,(on)}$	V_D = 15V	8	10	12	mA
	Normal	$I_{FO\,(off)}$		—	—	1	
Over Current Protection Trip Level		OC	V_D = 15V, T_j = 125°C	420	540	—	A
Short Circuit Protection Trip Level		SC	V_D = 15V, T_j = 125°C	630	810	—	A
Over Current Cut-Off Time		$t_{off\,(OC)}$	V_D = 15V	—	10	—	μs
Over Temperature Protection	Trip Level	OT	Case temperature	111	118	125	°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 = 15V	1	2	3	ms

c. Thermal resistance (T_j = 25°C)

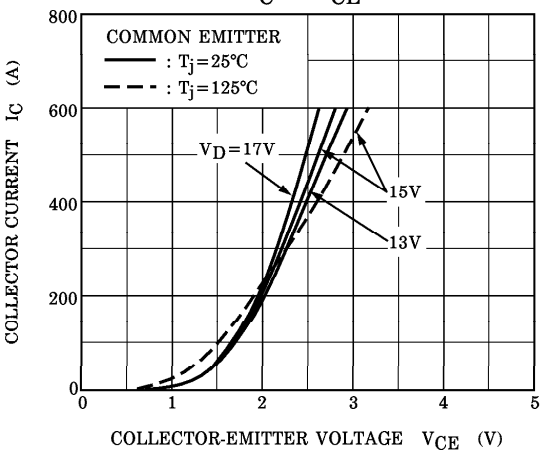
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Junction to Case Thermal Resistance	$R_{th\,(j\text{-}c)}$	IGBT	—	—	0.104	°C / W
		FRD	—	—	0.208	
Case to Fin Thermal Resistance	$R_{th\,(c\text{-}f)}$	Compound is applied	—	0.03	—	°C / W

Note 1 : Switching time test circuit & timing chart

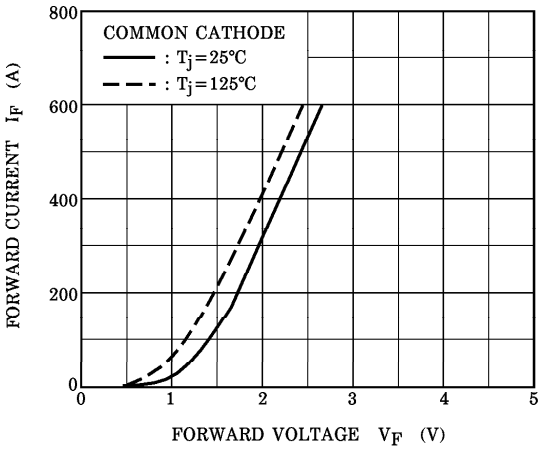




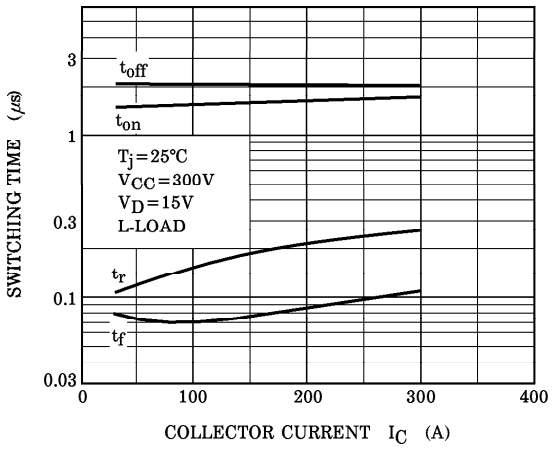
I_C – V_{CE}



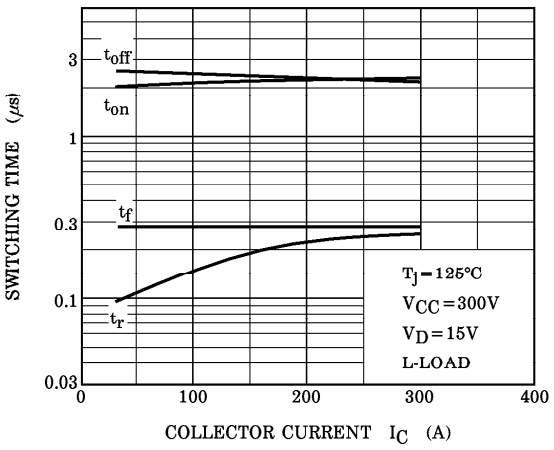
I_F – V_F



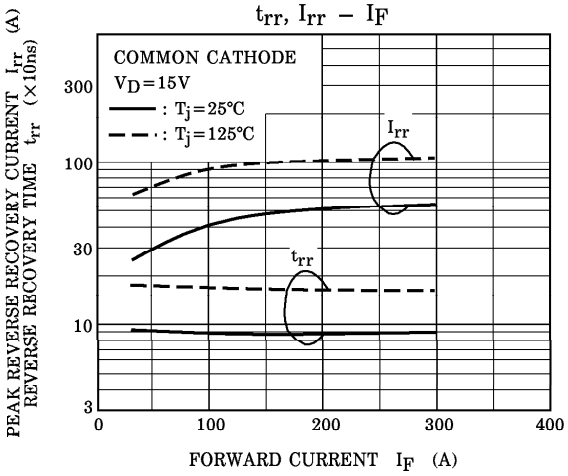
SWITHING TIME – I_C



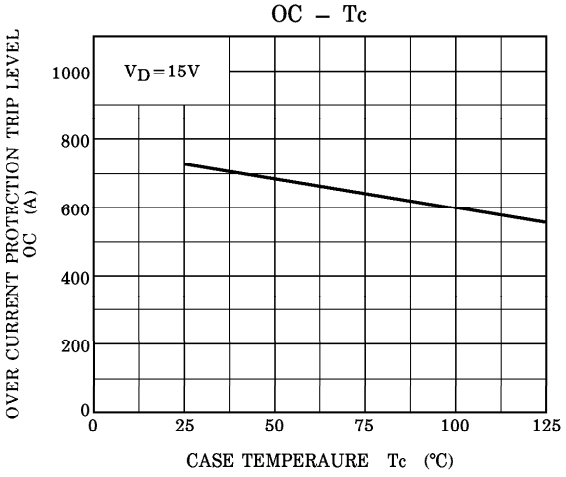
SWITHING TIME – I_C



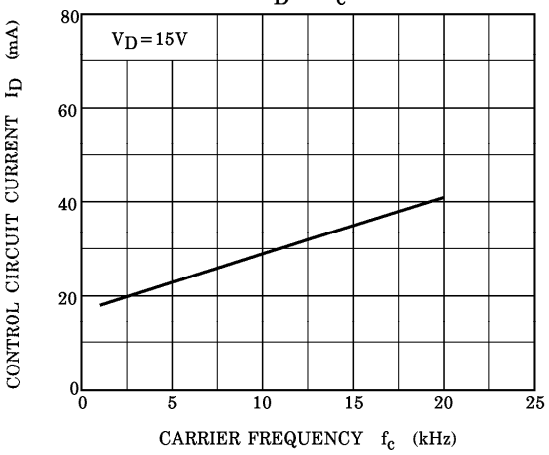
t_{rr}, I_{rr} – I_F



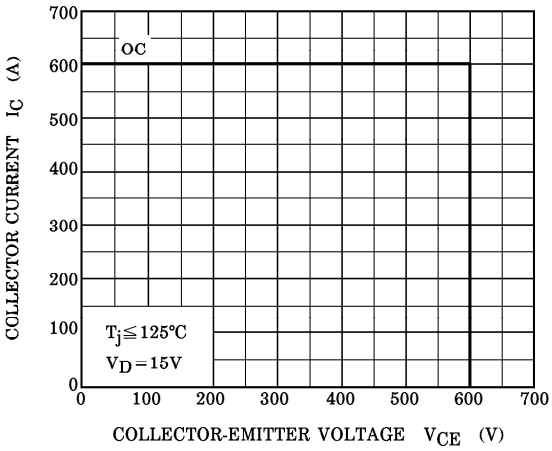
OC – Tc



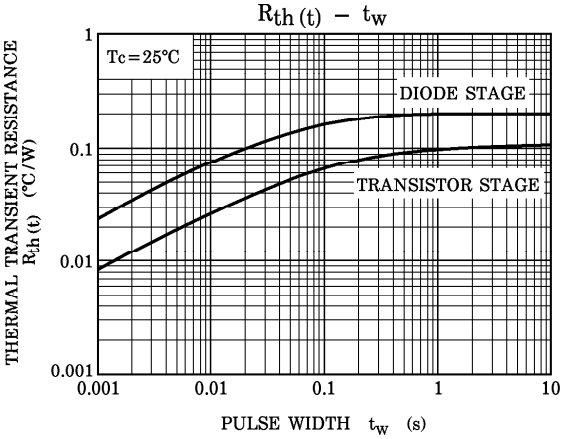
$I_D - f_c$



REVERSE BIAS SOA

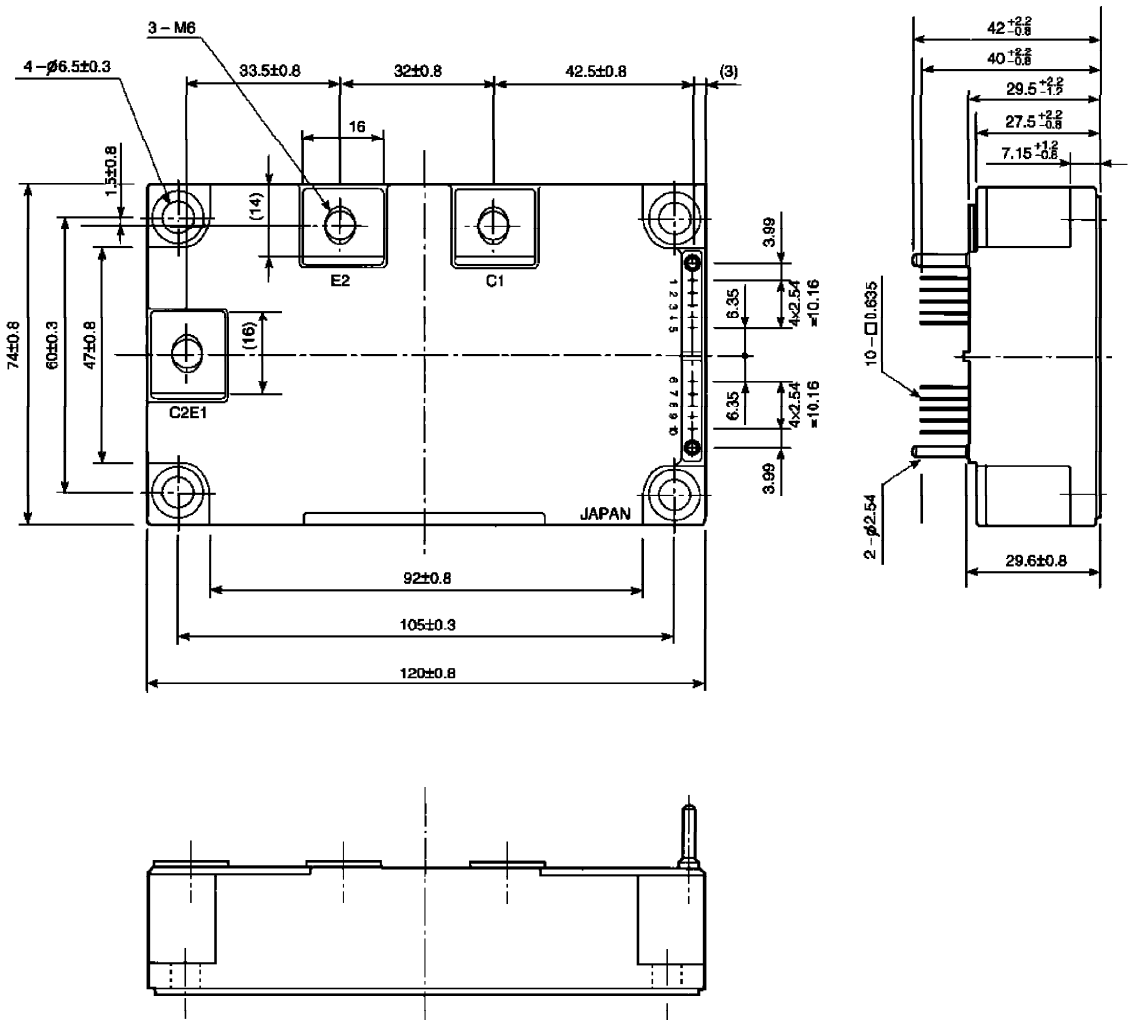


$R_{th}(t) - t_w$



OUTLINE

Unit : mm



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