

TOSHIBA INTELLIGENT POWER MODULE SILICON N CHANNEL IGBT

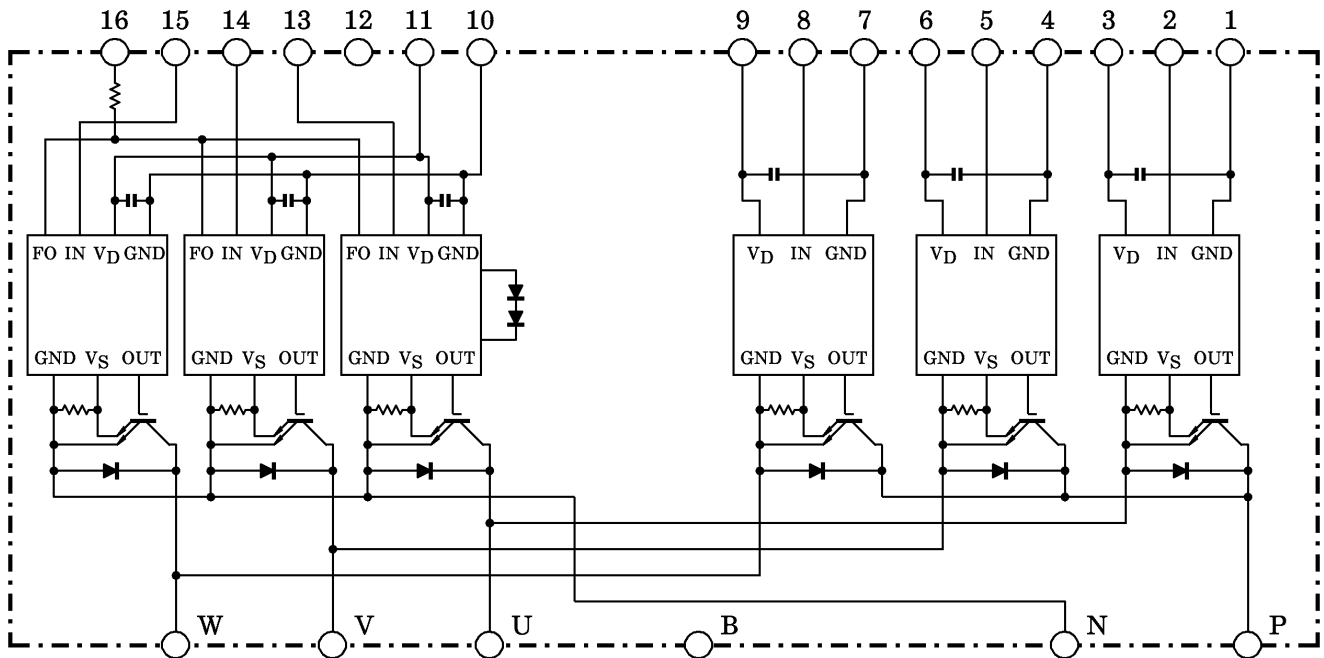
MIG100J101H

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter & 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 : $V_{CE(sat)} = 2.5 \text{ V (Max.)}$
 $t_{off} = 3.0 \mu\text{s (Max.)}$
 $t_{rr} = 0.30 \mu\text{s (Max.)}$
- Outline : TOSHIBA 2-110A1A
- Weight : 520 g

EQUIVALENT CIRCUIT



- | | | | | | |
|------------|------------|--------------|-------------|---------------|--------------|
| 1. GND (U) | 2. IN (U) | 3. V_D (U) | 4. GND (V) | 5. IN (V) | 6. V_D (V) |
| 7. GND (W) | 8. IN (W) | 9. V_D (W) | 10. GND (L) | 11. V_D (L) | 12. OPEN |
| 13. IN (X) | 14. IN (Y) | 15. IN (Z) | 16. FO | | |

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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}	450	V
	Collector-Emitter Voltage	—	V_{CES}	600	V
	Collector Current	$T_c = 25^\circ\text{C}$, DC	I_C	100	A
	Forward Current	$T_c = 25^\circ\text{C}$, DC	I_F	100	A
	Collector Power Dissipation	$T_c = 25^\circ\text{C}$	P_C	300	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~+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	M5	—	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}	$V_{CEX} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	—	—	1	mA
			$T_j = 125^\circ\text{C}$	—	—	20	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{ V}$, $I_C = 100\text{ A}$ $V_{IN} = 15\text{ V} \rightarrow 0\text{ V}$	$T_j = 25^\circ\text{C}$	—	2.0	2.5	V
			$T_j = 125^\circ\text{C}$	—	2.0	—	
Forward Voltage	V_F	$I_F = 100\text{ A}$	—	2.1	3.3	V	
Switching Time	t_{on}	$V_{CC} = 300\text{ V}$, $I_C = 100\text{ A}$ $V_D = 15\text{ V}$, $V_{IN} = 15\text{ V} \leftrightarrow 0\text{ V}$ Inductive load (Note 1)	—	1.0	2.0	μs	
	t_{off}		—	1.7	3.0		
	t_f		—	0.2	0.5		
	t_{rr}		—	0.1	0.3		

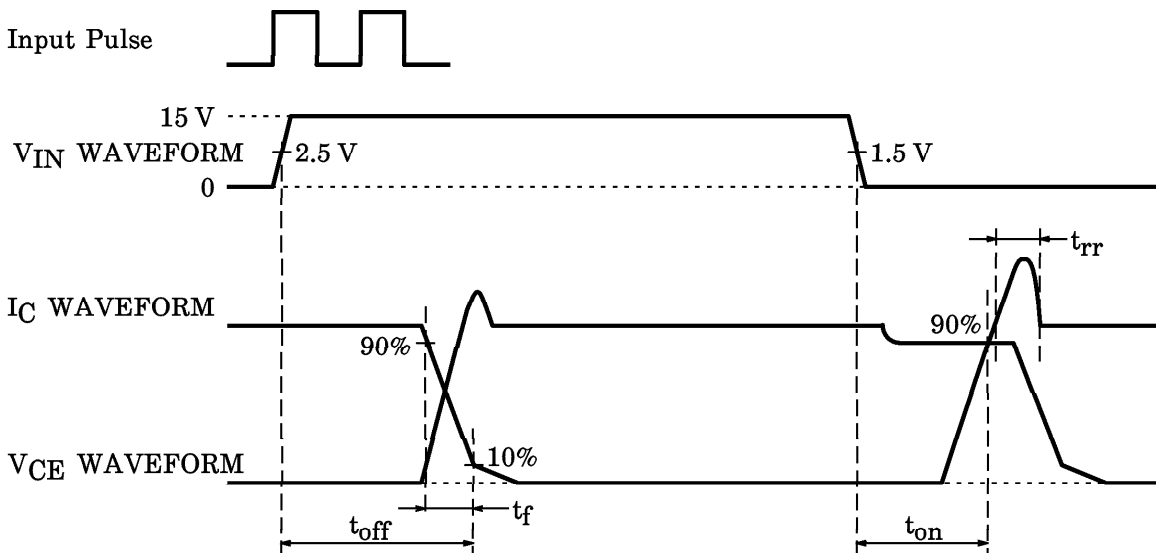
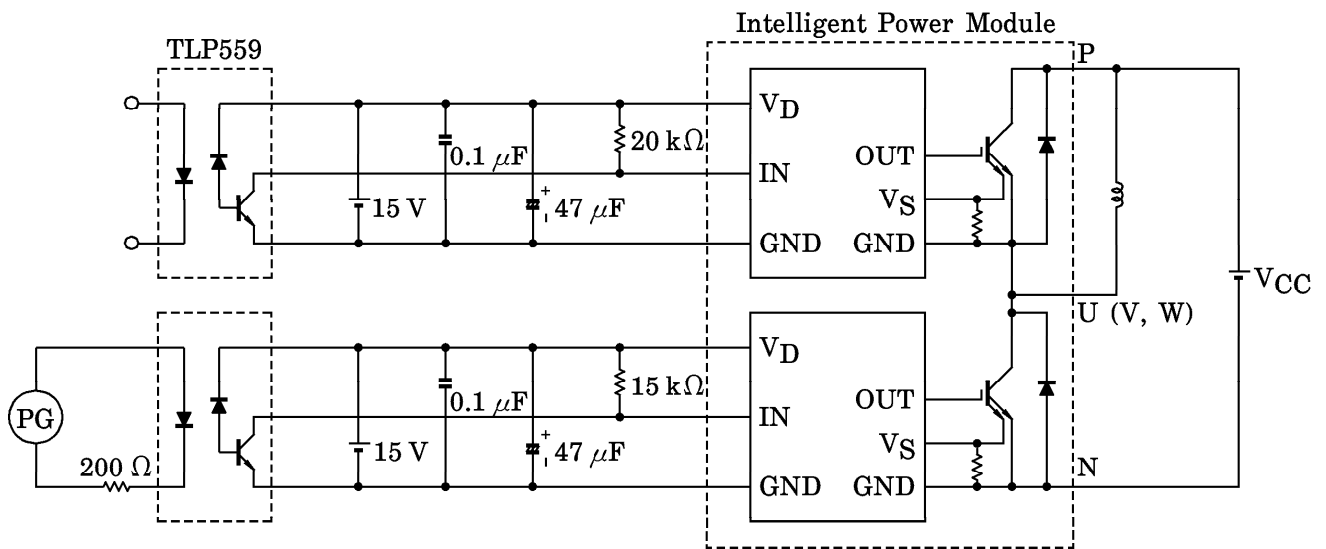
b. Control stage ($T_j = 25^\circ\text{C}$)

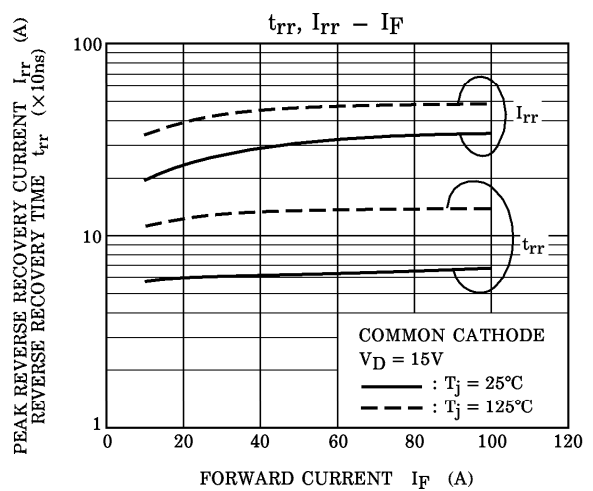
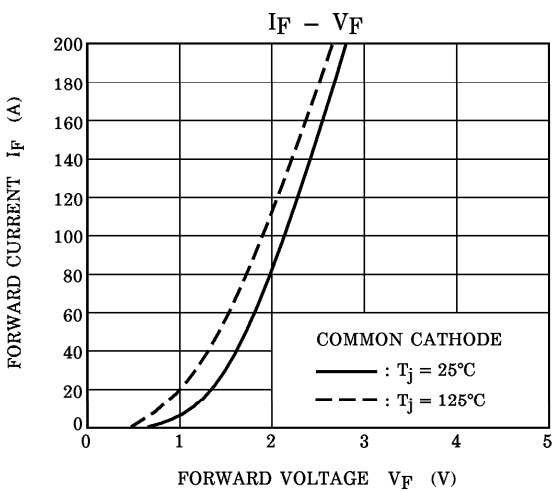
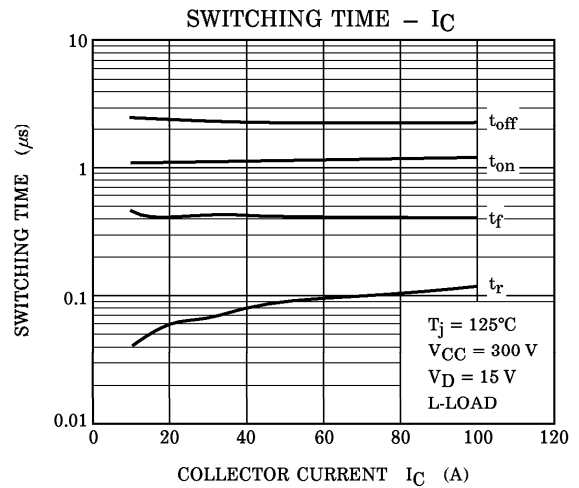
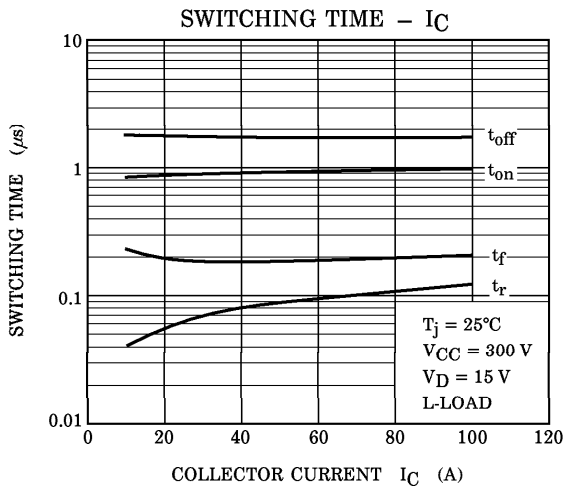
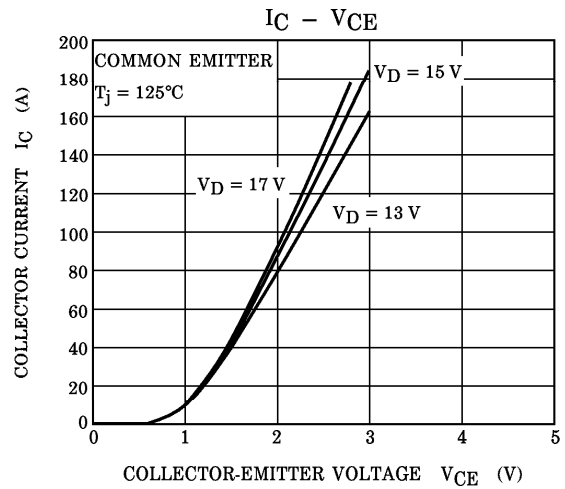
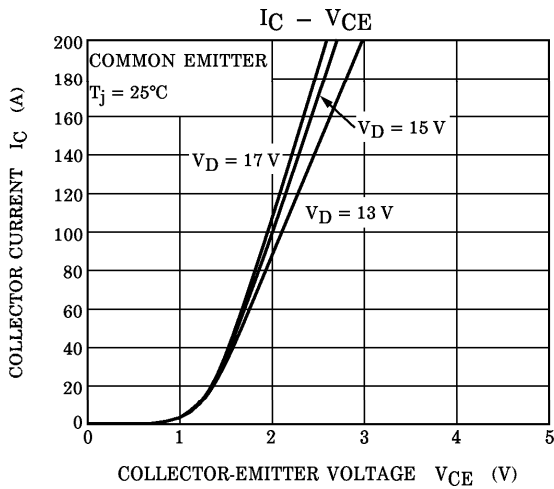
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Circuit Current	High Side	$I_D(H)$	$V_D = 15\text{ V}$	—	8	—	mA
	Low Side	$I_D(L)$		—	24	—	
Input-On Signal Voltage		$V_{IN(on)}$	$V_D = 15\text{ V}, I_C = 100\text{ mA}$	1.3	1.5	1.7	V
Input-Off Signal Voltage		$V_{IN(off)}$	$V_D = 15\text{ V}, I_C = 100\text{ mA}$	2.2	2.5	2.8	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	Inverter	OC	$V_D = 15\text{ V}, T_j = 125^\circ\text{C}$	160	200	—	A
Short Current Protection Trip Level	Inverter	SC	$V_D = 15\text{ V}, T_j = 125^\circ\text{C}$	240	300	—	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		—	12.5	—	
Fault Output Pulse Width		t_{FO}	$V_D = 15\text{ V}$	1	2	3	ms

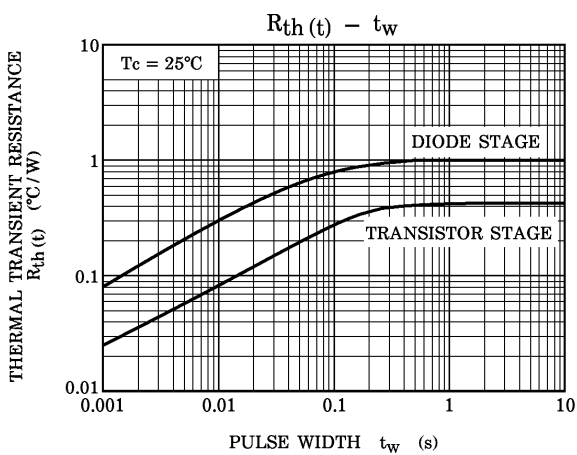
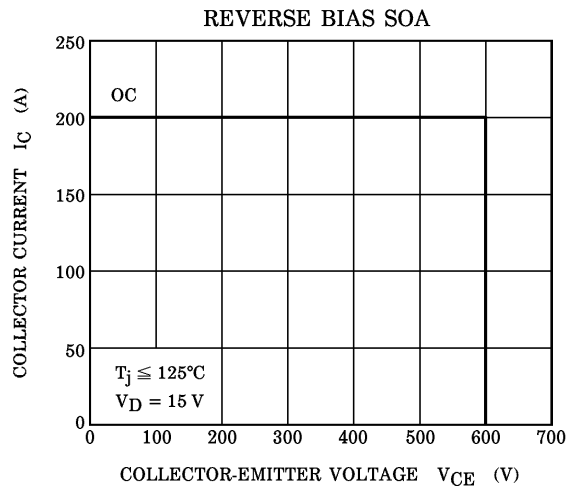
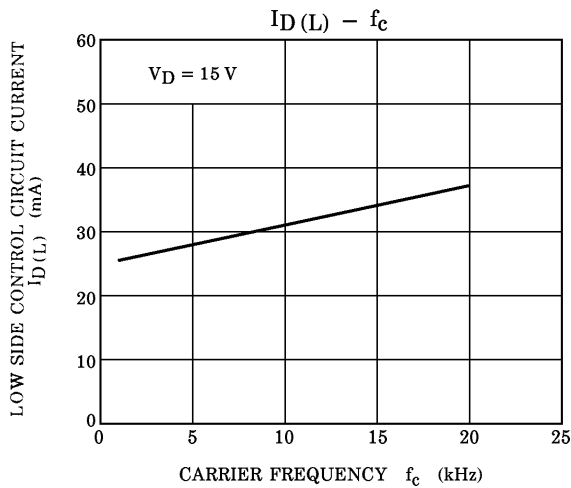
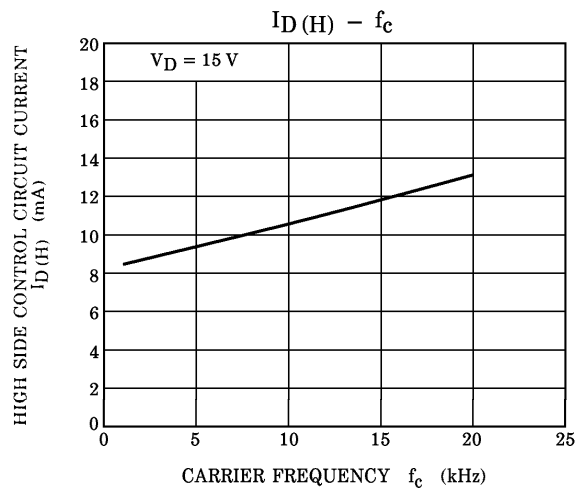
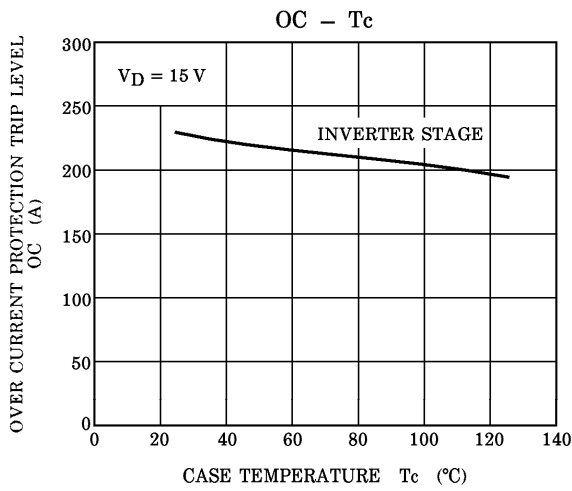
c. Thermal resistance ($T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Junction to Case Thermal Resistance	$R_{th(j-c)}$	Inverter IGBT stage	—	—	0.418	$^\circ\text{C/W}$
		Inverter FRD stage	—	—	1.000	
Case to Fin Thermal Resistance	$R_{th(c-f)}$	Compound is applied	—	0.05	—	$^\circ\text{C/W}$

Note 1 : Switching time test circuit & timing chart







OUTLINE

Unit : mm

