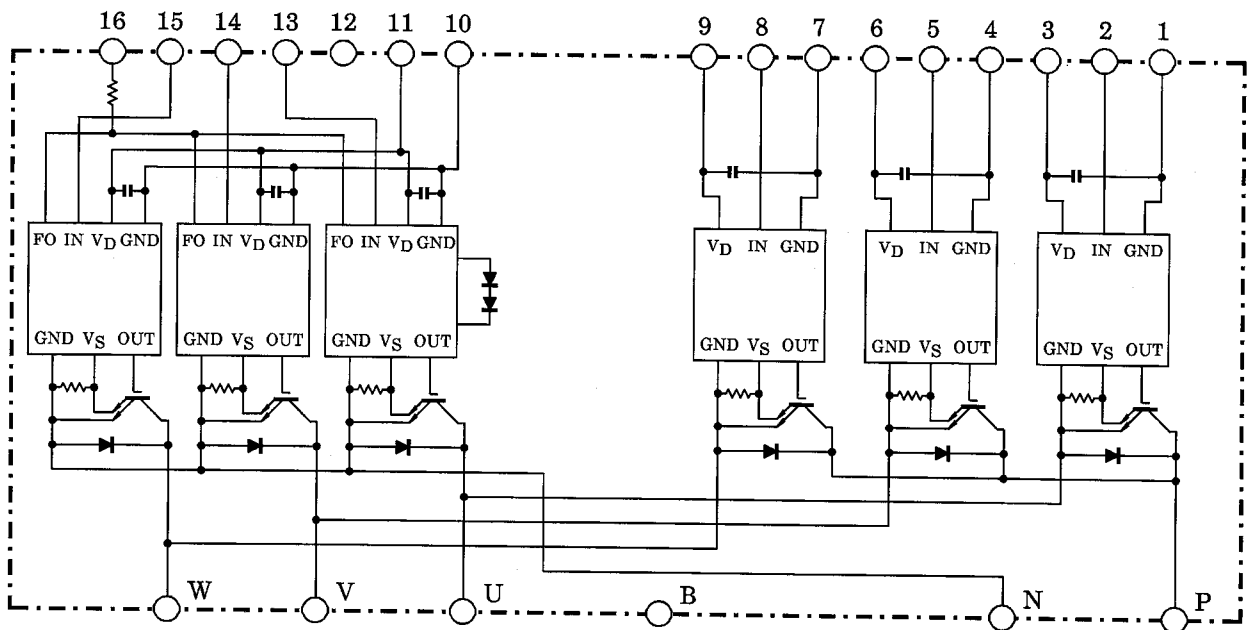


MIG100J101H

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. VD (U)	4. GND (V)	5. IN (V)	6. VD (V)
7. GND (W)	8. IN (W)	9. VD (W)	10. GND (L)	11. VD (L)	12. OPEN
13. IN (X)	14. IN (Y)	15. IN (Z)	16. FO		

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	—	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	M5	—	3	N·m

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}	$V_{CE} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	—	—	1	mA
			$T_j = 125^\circ\text{C}$	—	—	20	
Collector-emitter saturation voltage	$V_{CE}(\text{sat})$	$V_D = 15\text{ V}$, $I_C = 100\text{ A}$ $V_{IN} = 15\text{ V} \rightarrow 0\text{ V}$	$T_j = 25^\circ\text{C}$	—	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		

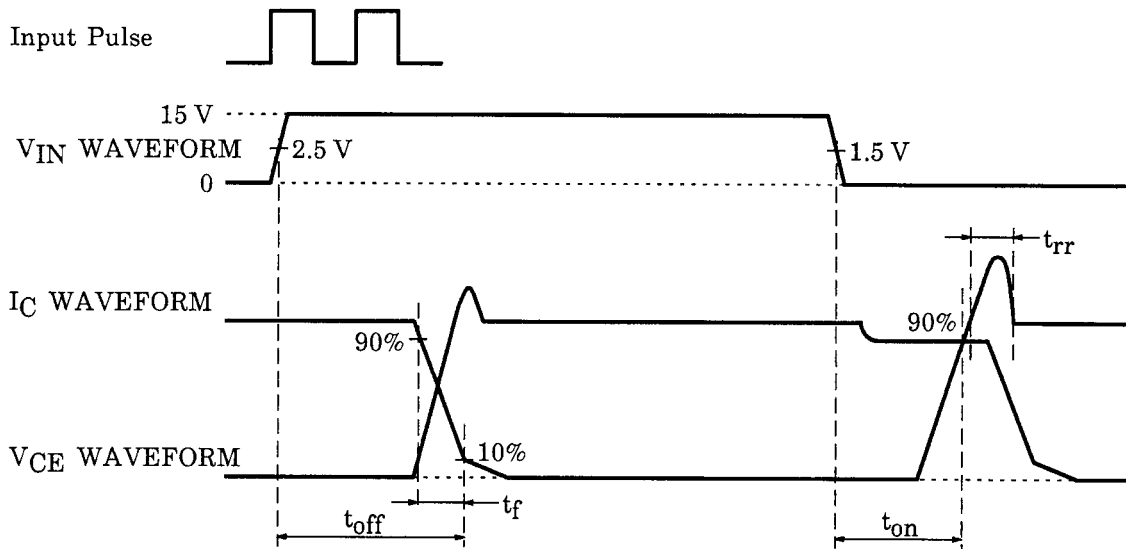
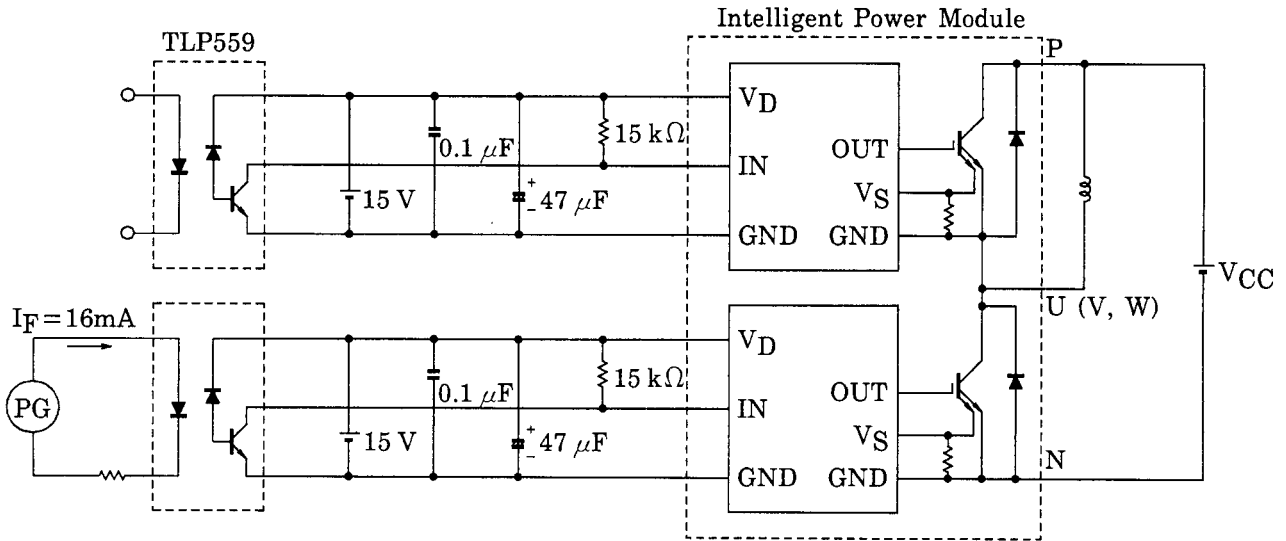
b. Control Stage ($T_j = 25^\circ\text{C}$)

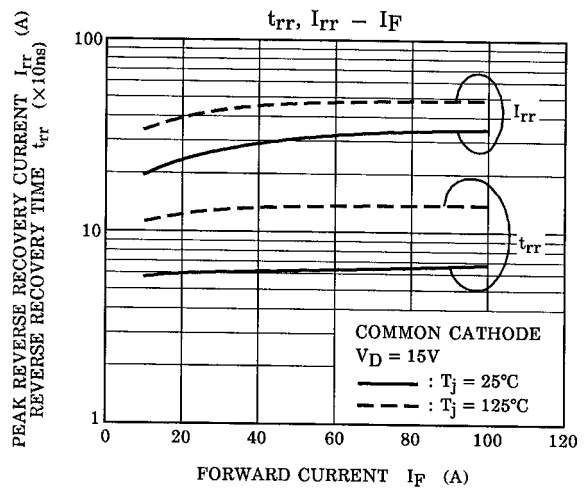
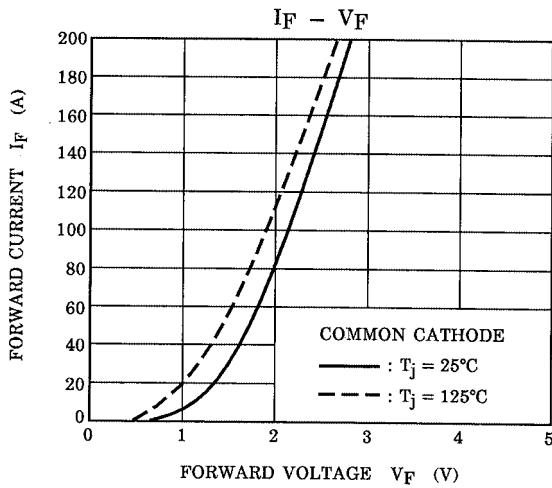
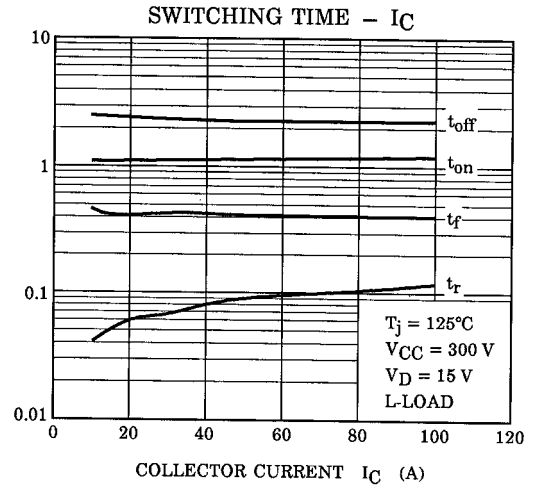
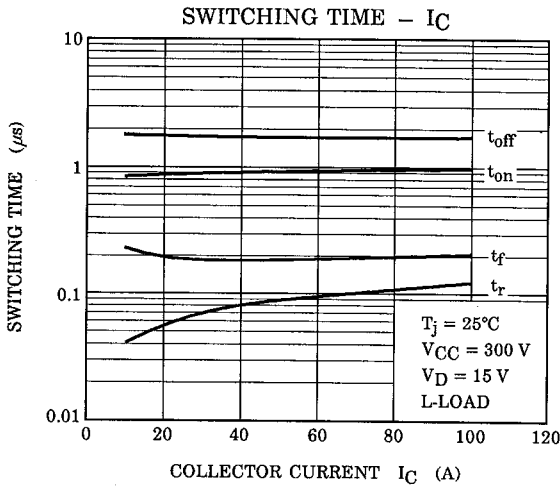
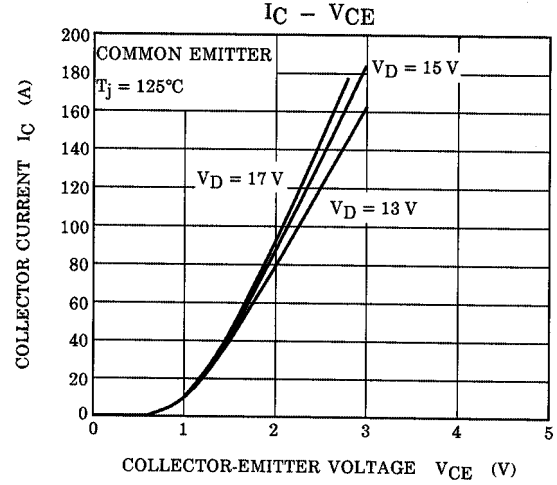
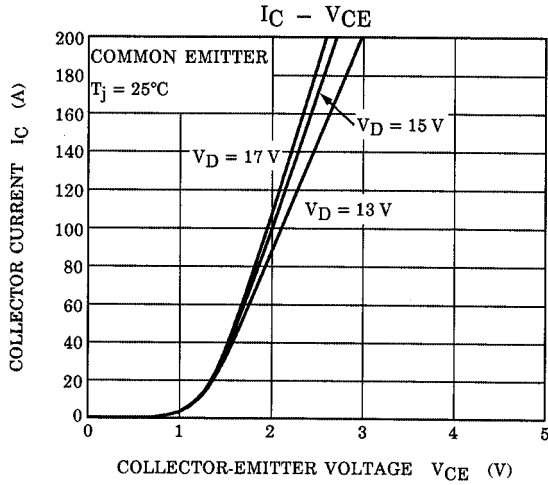
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Control circuit current	High side	I_D (H)	$V_D = 15\text{ V}$	—	8	—	mA
	Low side	I_D (L)		—	24	—	
Input-on signal voltage		V_{IN} (on)	$V_D = 15\text{ V}, I_C = 100\text{ mA}$	1.3	1.5	1.7	V
Input-off signal voltage		V_{IN} (off)	$V_D = 15\text{ V}, I_C = 100\text{ mA}$	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

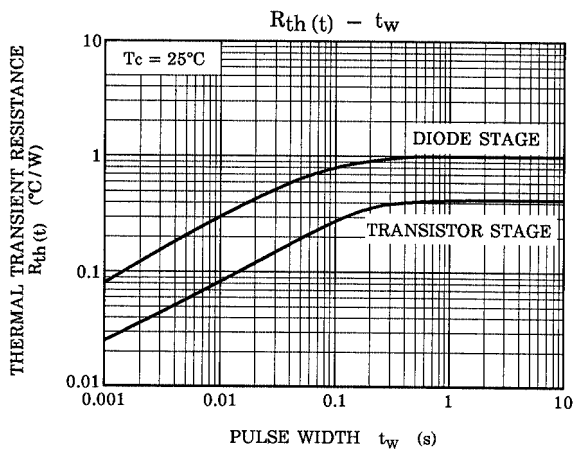
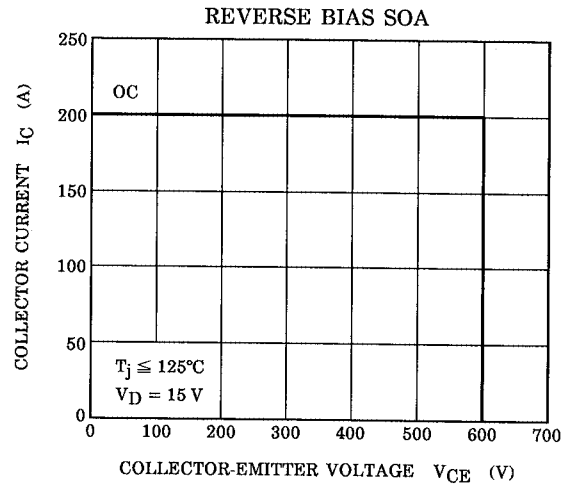
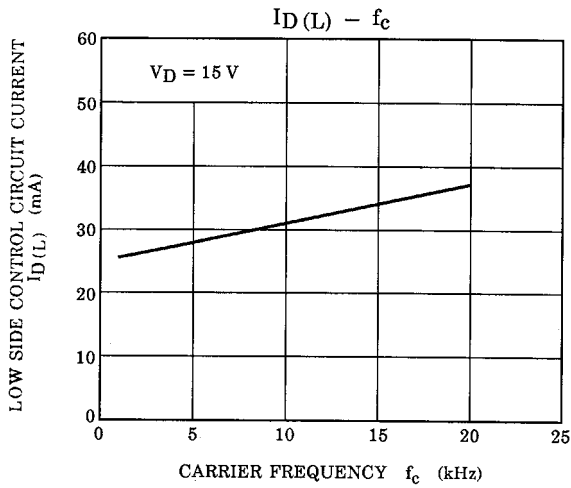
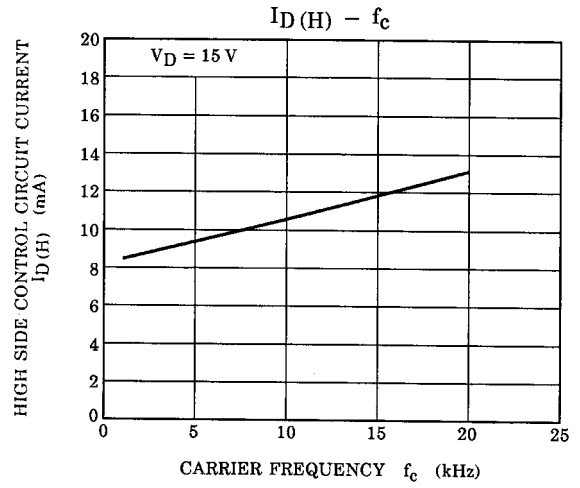
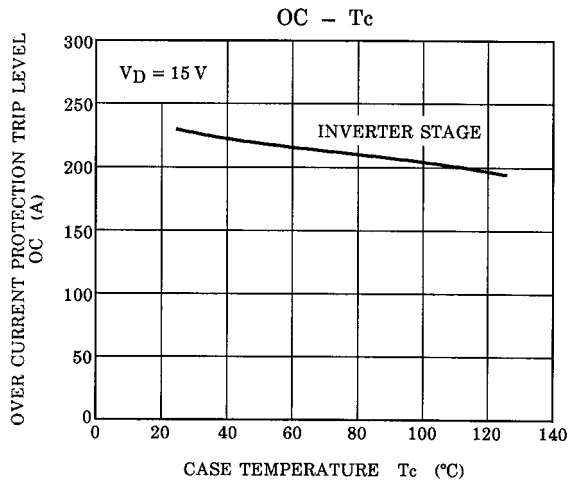
c. Thermal Resistance ($T_j = 25^\circ\text{C}$)

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







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