TOSHIBA INTELLIGENT GTR MODULE SILICON N CHANNEL IGBT

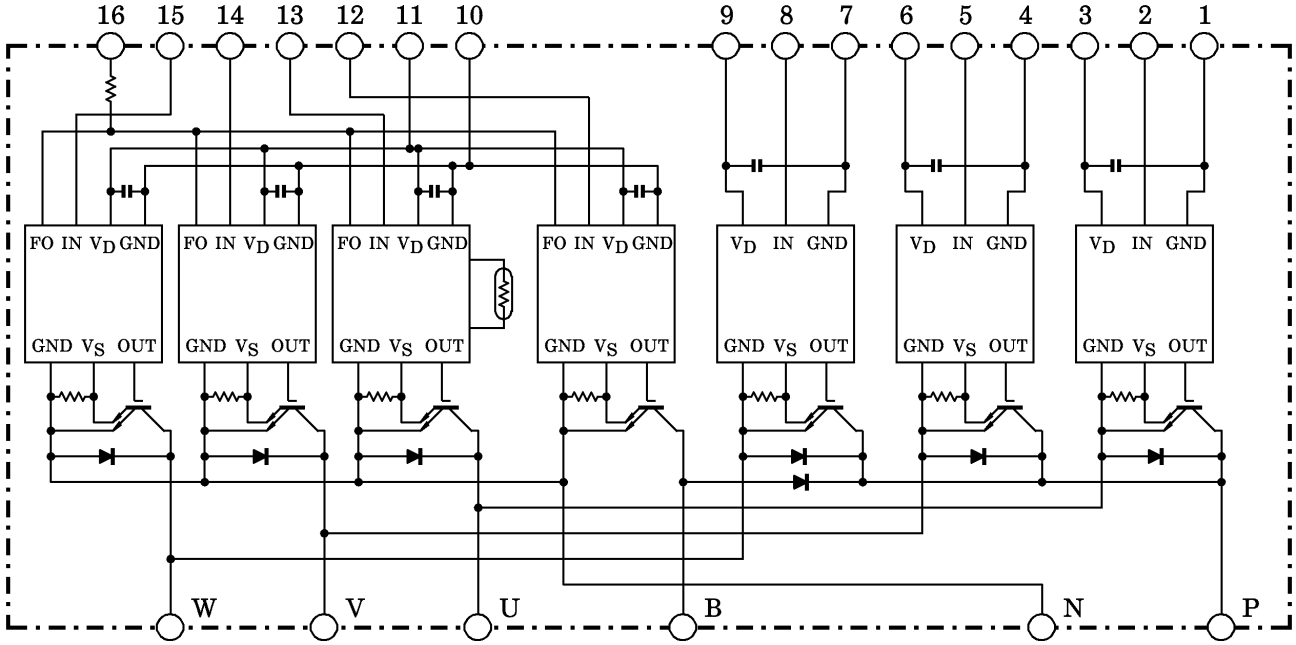
MIG150Q201H

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter Power Circuits & Brake Circuits & Control Circuits (IGBT drive unit, Protection units for Over-Current, Under-Voltage & Over-Temperature) in One Package.
- The Electrodes are Isolated from Case.

EQUIVALENT CIRCUIT



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7. GND (W)	8. IN (W)	9. V_D (W)	10. GND (L)	11. V_D (L)	12. IN (B)
13. IN (X)	14. IN (Y)	15. IN (Z)	16. FO		

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MAXIMUM RATINGS (T_j = 25°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	Tc = 25°C, DC	I_C	150	A
	Forward Current	Tc = 25°C, DC	I_F	150	A
	Collector Power Dissipation	Tc = 25°C	P_C	800	W
	Junction Temperature	—	T_j	150	°C
Brake	Supply Voltage	P-N power terminal	V_{CC}	900	V
	Collector-Emitter Voltage	—	V_{CES}	1200	V
	Collector Current	Tc = 25°C, DC	I_C	50	A
	Reverse Voltage	—	V_R	1200	V
	Forward Current	Tc = 25°C, DC	I_F	50	A
	Collector Power Dissipation	Tc = 25°C	P_C	350	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}	10	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	M5	—	3	N·m

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

a. Inverter stage

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Collector Cut-Off Current	I_{CEX}	V_{CE} = 1200 V	T_j = 25°C	—	—	1	mA
			T_j = 125°C	—	—	20	
Collector-Emitter Saturation Voltage	$V_{CE\ (sat)}$	V_D = 15 V, I_C = 150 A, V_{IN} = 3 V → 0 V	T_j = 25°C	—	2.6	3.5	V
			T_j = 125°C	—	2.5	—	
Forward Voltage	V_F	I_F = 150 A		—	2.2	3.0	V
Switching Time	t_{on}	V_{CC} = 600 V, I_C = 150 A, V_D = 15 V, V_{IN} = 3 V ↔ 0 V, Inductive load (Note 1)		0.8	1.5	2.1	μs
	$t_{c\ (on)}$			—	0.7	1.4	
	t_{rr}			—	0.18	0.25	
	t_{off}			—	1.3	2.2	
	$t_{c\ (off)}$			—	0.25	0.5	

b. Brake stage (T_j = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Collector Cut-Off Current	I_{CEX}	V_{CE} = 1200 V	T_j = 25°C	—	—	1	mA
			T_j = 125°C	—	—	20	
Collector-Emitter Saturation Voltage	$V_{CE\ (sat)}$	V_D = 15 V, I_C = 50 A V_{IN} = 3 V → 0 V	T_j = 25°C	—	2.7	3.5	V
			T_j = 125°C	—	2.5	—	
Reverse Current	I_R	V_R = 1200 V	T_j = 25°C	—	—	1	mA
			T_j = 125°C	—	—	20	
Forward Voltage	V_F	I_F = 50 A		—	1.4	2.2	V
Switching Time	t_{on}	V_{CC} = 600 V, I_C = 50 A V_D = 15 V, V_{IN} = 3 V ↔ 0 V Inductive load (Note 1)		0.7	1.4	2.0	μs
	$t_{c\ (on)}$			—	0.85	1.6	
	t_{rr}			—	0.42	0.5	
	t_{off}			—	1.9	2.6	
	$t_{c\ (off)}$			—	0.4	0.8	

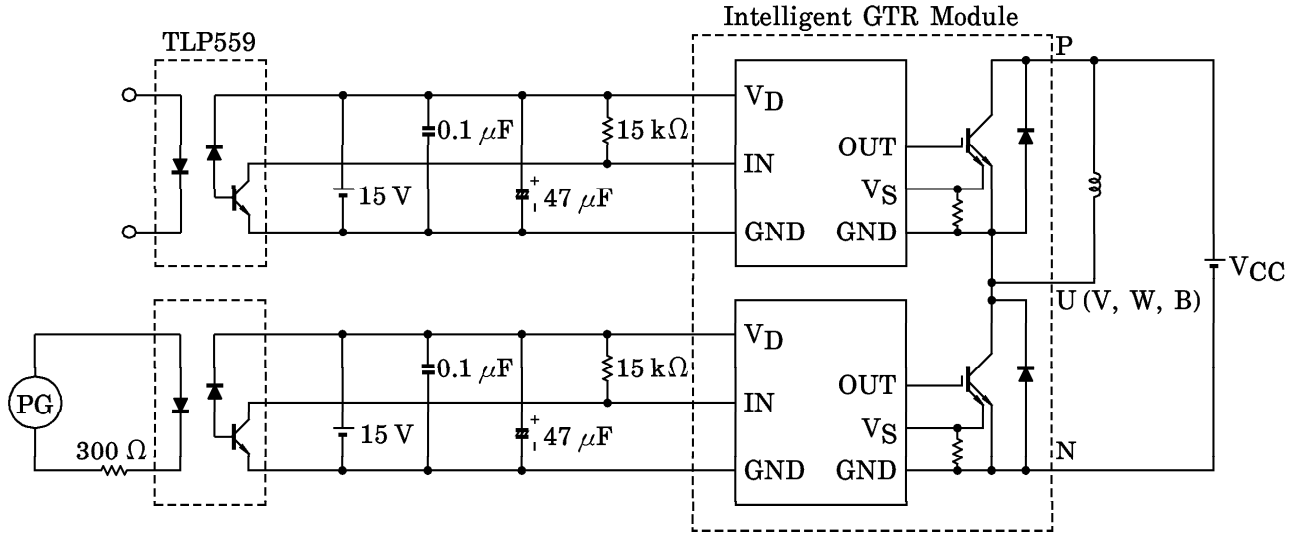
c. Control stage (T_j = 25°C)

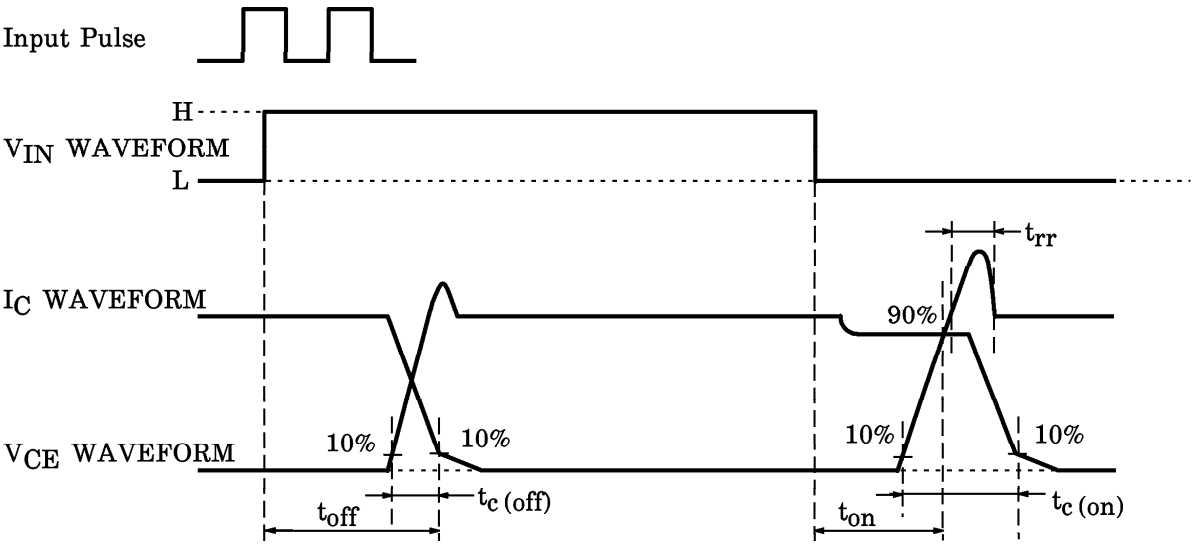
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Circuit Current	High Side	$I_{D\ (H)}$	V_D = 15 V	—	20	30	mA
	Low Side	$I_{D\ (L)}$		—	80	120	
Input-On Signal Voltage		$V_{IN\ (on)}$	V_D = 15 V, I_C = 150 mA	0.9	1.1	1.3	V
Fault Output Current	Protection	$I_{FO\ (on)}$	V_D = 15 V	8	10	12	mA
	Normal	$I_{FO\ (off)}$		—	—	0.1	
Over Current Protection Trip Level	Inverter	OC	V_D = 15 V, $T_j \leqq$ 125°C	230	320	—	A
	Brake			80	110	—	
Short Circuit Protection Trip Level	Inverter	SC	V_D = 15 V, $T_j \leqq$ 125°C	320	400	—	A
	Brake			120	150	—	
Over Current Cut-Off Time		$t_{off\ (OC)}$	V_D = 15 V	—	5	—	μs
Over Temperature Protection	Trip Level	OT	Case temperature	111	118	125	°C
	Reset Level	OTr		—	98	—	
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 V	1	2	3	ms

d. Thermal resistance (T_j = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Junction to Case Thermal Resistance	$R_{th\ (j\text{-}c)}$	Inverter IGBT	—	—	0.156	°C / W
		Inverter FRD	—	—	0.5	
		Brake IGBT	—	—	0.36	
		Brake FRD	—	—	1.0	
Case to Fin Thermal Resistance	$R_{th\ (c\text{-}f)}$	Compound is applied	—	0.04	—	°C / W

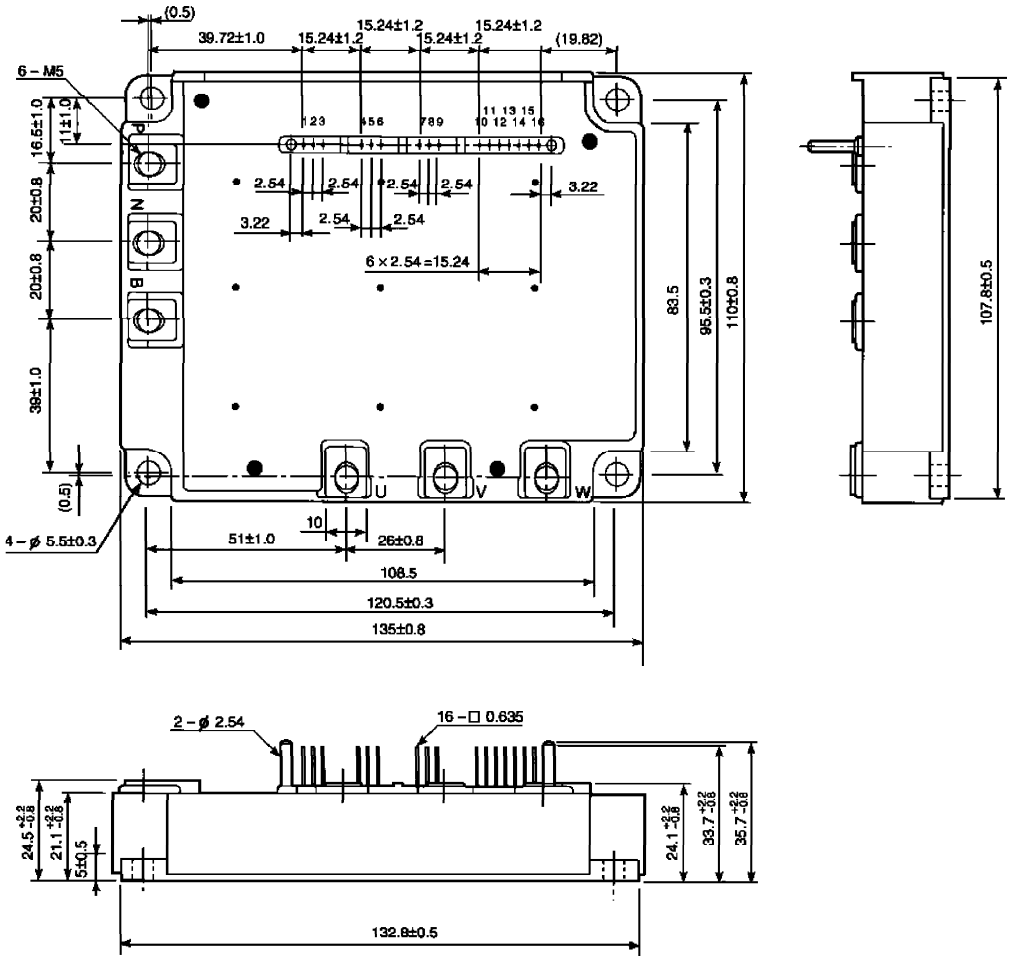
(Note 1) Switching time test circuit & timing chart





OUTLINE

Unit : mm



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