TOSHIBA Intelligent Power Module Silicon N Channel IGBT

# MIG150Q101H

High Power Switching Applications

Motor Control Applications

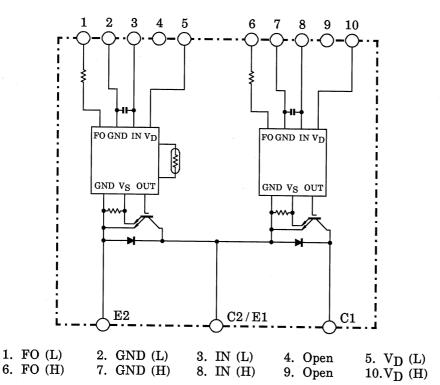
- Integrates inverter power & control circuits (IGBT drive units, protection units for over-current, under-voltage & over-temperature) in one package.
- The electrodes are isolated from case.
- High speed type IGBT : V<sub>CE</sub> (sat) = 3.5 V (Max.)

 $t_{off} = 3.8 \ \mu s$  (Max.)

 $t_{rr} = 0.24 \ \mu s$  (Max.)

- Package Dimensions : TOSHIBA 2-121A1A
- Weight : 510 g

#### **Equivalent Circuit**



## Maximum Ratings (T<sub>j</sub> = 25°C)

Stage	Characteristic	Condition	Symbol	Ratings	Unit
Inverter	Supply voltage	P-N power terminal	V <sub>CC</sub>	900	V
	Collector-emitter voltage	—	V <sub>CES</sub>	1200	V
	Collector current	Tc = 25°C, DC	Ι <sub>C</sub>	150	А
	Forward current	Tc = 25°C, DC	lF	150	А
	Collector power dissipation	Tc = 25°C	P <sub>C</sub>	1200	W
	Junction temperature	—	Tj	150	°C
Control	Control supply voltage	V <sub>D</sub> -GND terminal	VD	20	V
	Input voltage	IN-GND terminal	V <sub>IN</sub>	20	V
	Fault output voltage	FO-GND (L) terminal	V <sub>FO</sub>	20	V
	Fault output current	FO sink current	I <sub>FO</sub>	14	mA
Module	Operating temperature	—	TC	-20 ~ +100	°C
	Storage temperature range	—	T <sub>stg</sub>	-40 ~ +125	°C
	Isolation voltage	AC 1 minute	V <sub>ISO</sub>	2500	V
	Screw torque	M6	—	3	N∙m

# Electrical Characteristics (T<sub>j</sub> = 25°C)

#### a. Inverter Stage

Characteristic	Symbol	Test Condition		Min	Тур.	Max	Unit
Collector cut-off current	lar	V <sub>CF</sub> = 1200 V	T <sub>j</sub> = 25°C	—	—	2	mA
	I <sub>CE</sub> V <sub>CE</sub>		T <sub>j</sub> = 125°C	_	_	40	mA
Collector-emitter saturation voltage	$V_{CE (sat)} \qquad \begin{array}{c} V_D = 15 \\ V_{IN} = 3 \end{array}$	$V_D$ = 15 V, $I_C$ = 150 A $V_{IN}$ = 3 V $\rightarrow$ 0 V	T <sub>j</sub> = 25°C		2.7	3.5	v
Conector-entitier saturation voltage		$V_{IN} = 3 V \rightarrow 0 V$	T <sub>j</sub> = 125°C	_	2.6	_	v
Forward voltage	VF	IF = 150 A			2.0	2.5	V
	t <sub>on</sub>	$V_{CC}$ = 600 V, I <sub>C</sub> = 150 A V <sub>D</sub> = 15 V, V <sub>IN</sub> = 3 V ↔ 0 V Inductive load		0.8	1.5	2.2	μs
	t <sub>c(on)</sub>			_	0.5	1.0	
Switching time	t <sub>rr</sub>			_	0.16	0.24	
	t <sub>off</sub>		(Attached 1)	_	3.3	3.8	
	t <sub>c(off)</sub>			_	0.4	0.8	

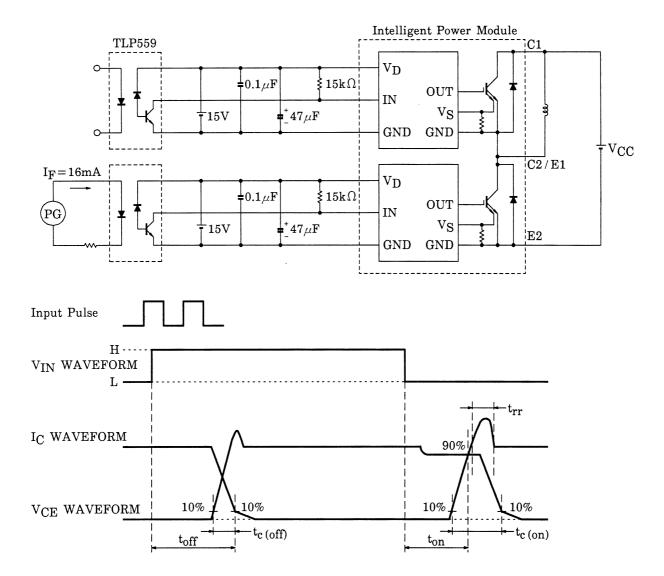
## b. Control Stage (T<sub>j</sub> = 25°C)

Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit
Control circuit current		ID	V <sub>D</sub> = 15 V	_	20	30	mA
Input-on signal voltage		V <sub>IN (on)</sub>	V <sub>D</sub> = 15 V, I <sub>C</sub> = 150 mA	0.9	1.1	1.3	V
Fault output current	Protection	I <sub>FO (on)</sub>	- V <sub>D</sub> = 15 V	8	10	12	mA
	Normal	I <sub>FO (off)</sub>		_	—	1	
Over current protection trip level		OC	V <sub>D</sub> = 15 V, T <sub>j</sub> = 125°C	210	300	_	А
Short current protection trip level		SC	V <sub>D</sub> = 15 V, T <sub>j</sub> = 125°C	315	450	_	А
Over current cut-off time		t <sub>off (OC)</sub>	V <sub>D</sub> = 15 V	_	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	V
Fault output pulse width		t <sub>FO</sub>	V <sub>D</sub> = 15 V	1	2	3	ms

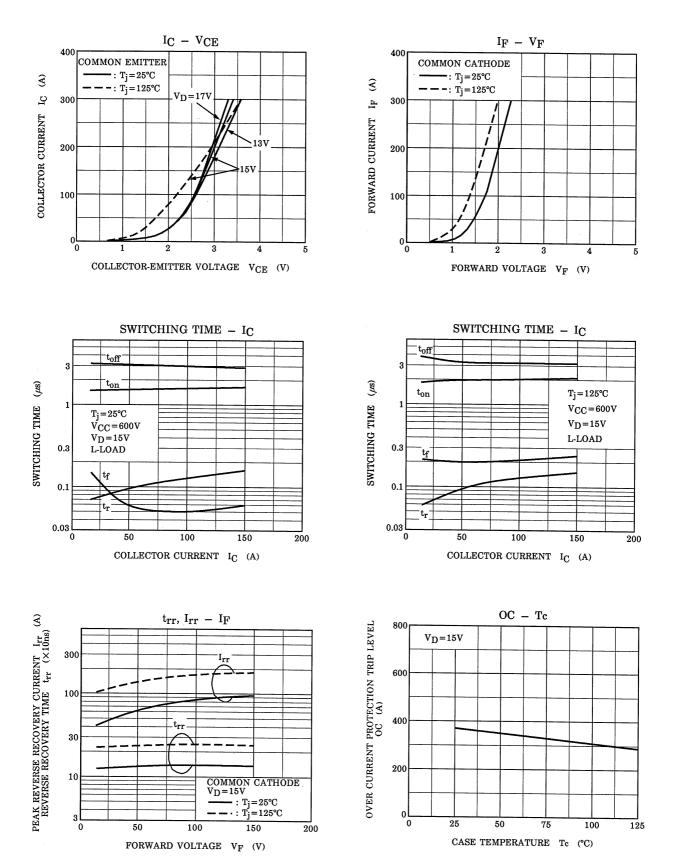
## c. Thermal Resistance ( $T_j = 25^{\circ}C$ )

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Junction to case thermal resistance	P., a ,	IGBT	_	_	0.104	°C/W
Sunction to case thermal resistance	R <sub>th (j-c)</sub>	FRD		_	0.25	
Case to fin thermal resistance	R <sub>th (c-f)</sub>	Compound is applied		0.03		°C/W

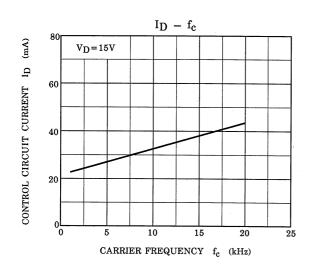
Note 1: Switching time test circuit & timing chart

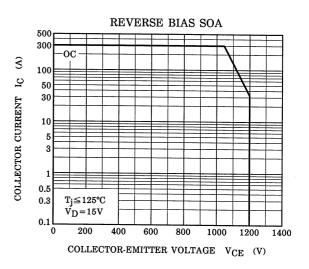


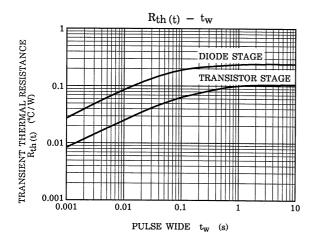
# TOSHIBA



# **TOSHIBA**

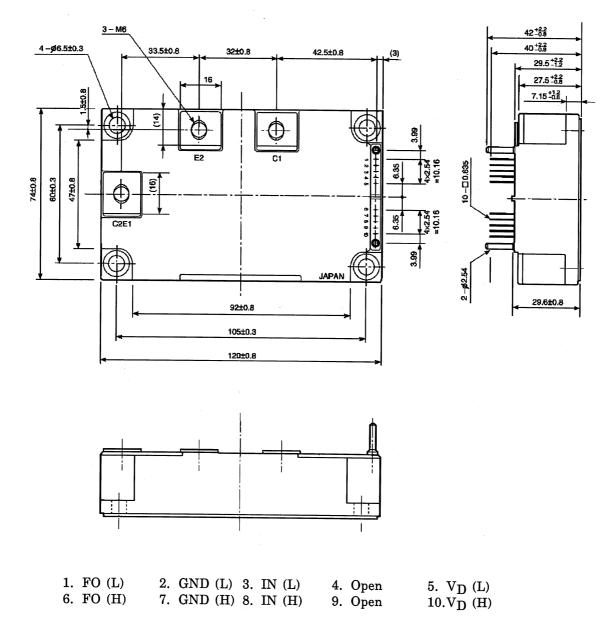






#### Package Dimensions: TOSHIBA 2-121A1A

Unit: mm



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