

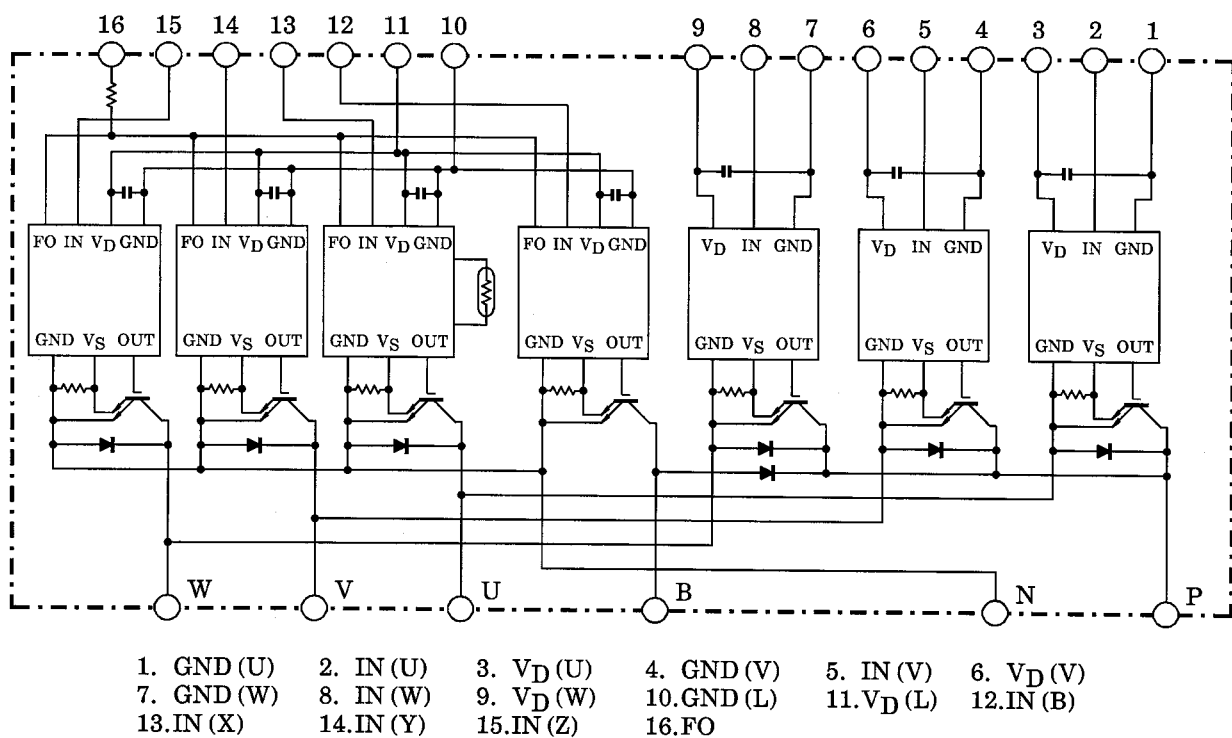
MIG150Q201H

High Power Switching Applications

Motor Control Applications

- Integrates inverter, brake 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.

Equivalent Circuit



Maximum Ratings ($T_j = 25^\circ\text{C}$)

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	$T_c = 25^\circ\text{C}$, DC	I_C	150	A
	Forward current	$T_c = 25^\circ\text{C}$, DC	I_F	150	A
	Collector power dissipation	$T_c = 25^\circ\text{C}$	P_C	800	W
	Junction temperature	—	T_j	150	$^\circ\text{C}$
Brake	Supply voltage	P-N power terminal	V_{CC}	900	V
	Collector-emitter voltage	—	V_{CES}	1200	V
	Collector current	$T_c = 25^\circ\text{C}$, DC	I_C	50	A
	Reverse voltage	—	V_R	1200	V
	Forward current	$T_c = 25^\circ\text{C}$, DC	I_F	50	A
	Collector power dissipation	$T_c = 25^\circ\text{C}$	P_C	350	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}	10	mA
Module	Operating temperature	—	T_C	$-20 \sim +100$	$^\circ\text{C}$
	Storage temperature range	—	T_{stg}	$-40 \sim +125$	$^\circ\text{C}$
	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}	$V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$	—	—	1	mA
			$T_j = 125^\circ\text{C}$	—	—	20	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_D = 15\text{ V}$, $I_C = 150\text{ A}$ $V_{IN} = 3\text{ V} \rightarrow 0\text{ V}$	$T_j = 25^\circ\text{C}$	—	2.6	3.5	V
			$T_j = 125^\circ\text{C}$	—	2.5	—	
Forward voltage	V_F	$I_F = 150\text{ A}$		—	2.2	3.0	V
Switching time	t_{on}	$V_{CC} = 600\text{ V}$, $I_C = 150\text{ A}$ $V_D = 15\text{ V}$, $V_{IN} = 3\text{ V} \leftrightarrow 0\text{ V}$ 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 ($T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition		Min	Typ.	Max	Unit
Collector cut-off current	I _{CEX}	V _{CE} = 1200V	T _j = 25°C	—	—	1	mA
			T _j = 125°C	—	—	20	
Collector-emitter saturation voltage	V _{CE (sat)}	V _D = 15V, I _C = 50A V _{IN} = 3V → 0V	T _j = 25°C	—	2.7	3.5	V
			T _j = 125°C	—	2.5	—	
Reverse current	I _R	V _R = 1200V	T _j = 25°C	—	—	1	mA
			T _j = 125°C	—	—	20	
Forward voltage	V _F	I _F = 50A		—	1.4	2.2	V
Switching time	t _{on}	V _{CC} = 600V, I _C = 50A V _D = 15V, V _{IN} = 3V↔ 0V 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	

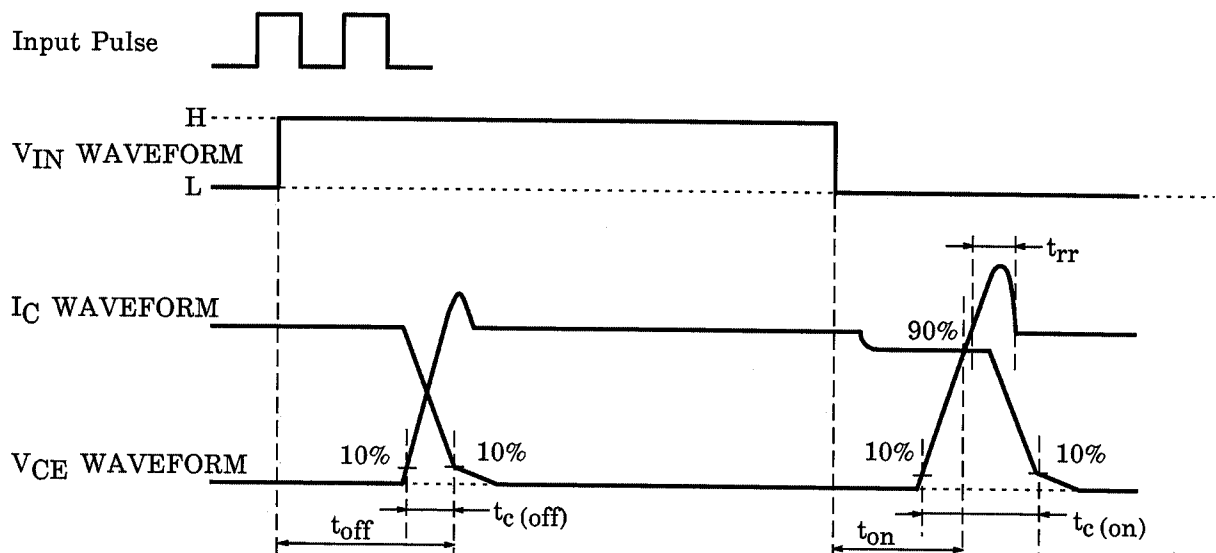
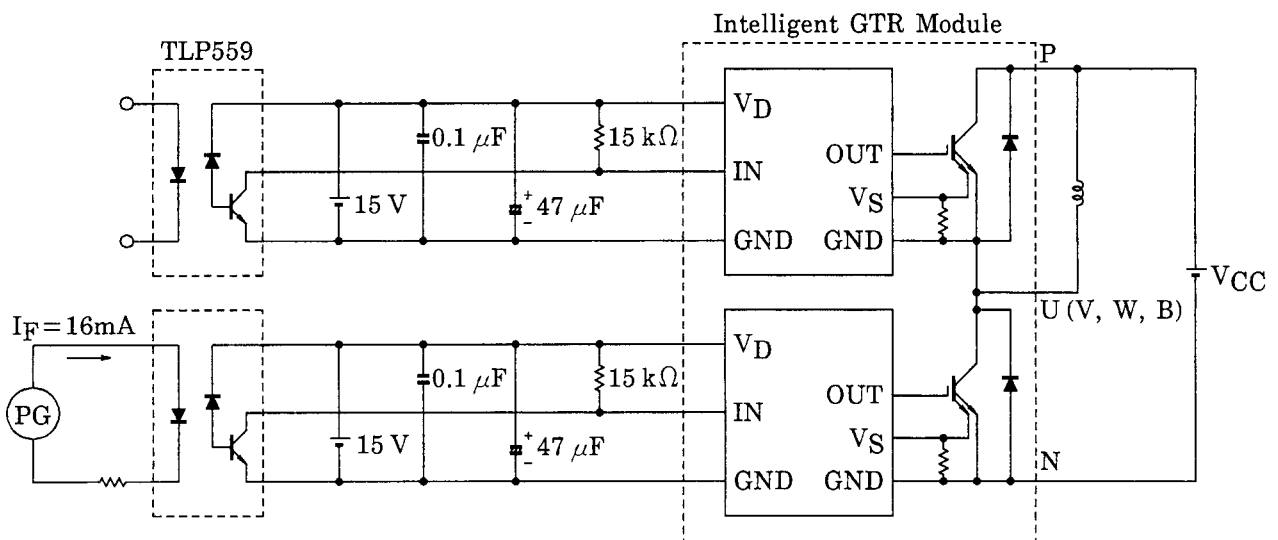
c. Control Stage ($T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Control circuit current	High side	$V_{\text{D}} = 15\text{V}$	—	20	30	mA
	Low side		—	80	120	
Input-on signal voltage	$V_{\text{IN (on)}}$	$V_{\text{D}} = 15\text{V}, I_{\text{C}} = 150\text{mA}$	0.9	1.1	1.3	V
Fault output current	Protection	$V_{\text{D}} = 15\text{V}$	8	10	12	mA
	Normal		—	—	0.1	
Over current protection trip level	Inverter	$V_{\text{D}} = 15\text{V}, T_j \leq 125^\circ\text{C}$	230	320	—	A
	Brake		80	110	—	
Short current protection trip level	Inverter	$V_{\text{D}} = 15\text{V}, T_j \leq 125^\circ\text{C}$	320	400	—	A
	Brake		120	150	—	
Over current cut-off time	$t_{\text{off (OC)}}$	$V_{\text{D}} = 15\text{V}$	—	5	—	μs
Over temperature protection	Trip level	Case temperature	111	118	125	$^\circ\text{C}$
	Reset level		—	98	—	
Control supply under voltage protection	Trip level	—	11.3	12.0	12.7	V
	Reset level		11.8	12.5	13.2	
Fault output pulse width	t_{FO}	$V_{\text{D}} = 15\text{V}$	1	2	3	ms

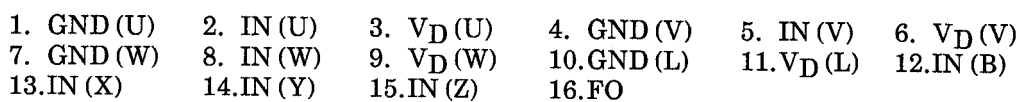
d. Thermal Resistance ($T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Junction to case thermal resistance	$R_{th(j-c)}$	Inverter IGBT	—	—	0.156	$^\circ\text{C} / \text{W}$
		Inverter FRD	—	—	0.5	
		Brake IGBT	—	—	0.36	
		Brake FRD	—	—	1.0	
Case to fin thermal resistance	$R_{th(c-f)}$	Compound is applied	—	0.04	—	$^\circ\text{C} / \text{W}$

Note 1: Switching time test circuit & timing chart



Unit: mm



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