

TENTATIVE TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

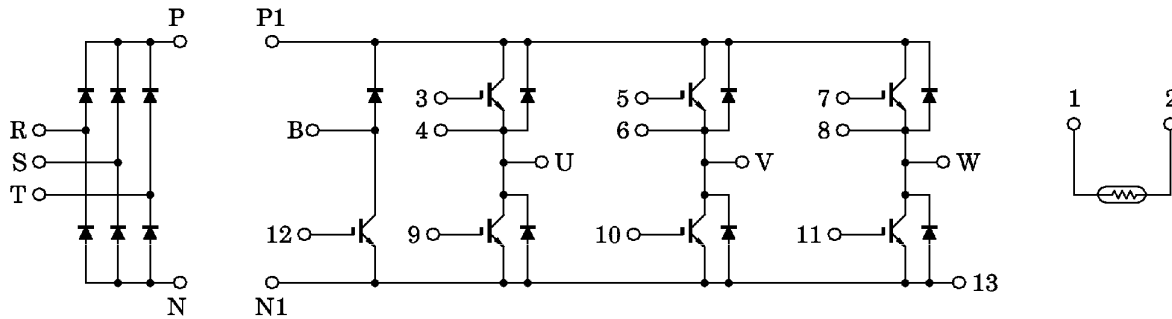
MIG50J906E, MIG50J906EA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter and Brake Power Circuits and Thermistor in One Package.
- Output (Inverter Stage) : 3φ 50 A / 600 V IGBT
- Input (Converter Stage) : 3φ 30 A / 800 V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Outline
 - MIG50J906E : 2-108E5A
 - MIG50J906EA : 2-108E6A
- Weight : 190 g

EQUIVALENT CIRCUIT



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MAXIMUM RATINGS (Ta = 25°C)

STAGE		CHARACTERISTIC		SYMBOL	RATING	UNIT	
Inverter		Collector-Emitter Voltage		V _{CES}	600	V	
		Gate-Emitter Voltage		V _{GES}	±20	V	
		Collector Current		DC	I _C	50	A
				1 ms	I _{CP}	100	A
		Forward Current		DC	I _F	50	A
				1 ms	I _{FM}	100	A
Collector Power Dissipation (T _c = 25°C)		P _C	200	W			
Converter		Repetitive Peak Reverse Voltage		V _{RRM}	800	V	
		Average Output Rectified Current		I _O	30	A	
		Peak One Cycle Surge Forward Current (50 Hz, Non-Repetitive)		I _{FSM}	400	A	
Brake	IGBT	Collector-Emitter Voltage		V _{CES}	600	V	
		Gate-Emitter Voltage		V _{GES}	±20	V	
		Collector Current		DC	I _C	50	A
				1 ms	I _{CP}	100	A
	Collector Power Dissipation (T _c = 25°C)		P _C	200	W		
	FWD	Reverse Voltage		V _R	600	V	
		Forward Current		DC	I _F	50	A
				1 ms	I _{FM}	100	A
Junction Temperature		T _j	150	°C			
Storage Temperature Range		T _{stg}	-40~125	°C			
Isolation Voltage		V _{Isol}	2500 (AC 1 minute)	V			
Screw Torque		—	6	N·m			

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

a. Inverter stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I _{GES}	V _{GE} = ±20 V, V _{CE} = 0	—	—	±500	nA
Collector Cut-Off Current		I _{CES}	V _{CE} = 600 V, V _{GE} = 0	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		V _{GE (off)}	I _C = 5 mA, V _{CE} = 5 V	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		V _{CE (sat)}	I _C = 50 A	—	2.3	2.8	V
			V _{GE} = 15 V				
Input Capacitance		C _{ies}	V _{CE} = 10 V, V _{GE} = 0, f = 1 MHz	—	—	—	pF
Switching Time	Rise Time	t _r	V _{CC} = 300 V	—	0.10	0.20	μs
	Turn-On Time	t _{on}	I _C = 50 A	—	0.25	0.50	
	Fall Time	t _f	V _{GE} = ±15 V	—	0.15	0.30	
	Turn-Off Time	t _{off}	R _G = 24 Ω (Note 1)	—	0.50	0.80	
Forward Voltage		V _F	I _F = 50 A, V _{GE} = 0	—	2.0	2.8	V
Reverse Recovery Time		t _{rr}	I _F = 50 A, V _{GE} = -10 V di / dt = 100 A / μs	—	0.08	0.15	μs
Thermal Resistance		R _{th (j-c)}	Transistor	—	—	0.6	°C / W
			Diode	—	—	1.5	

b. Converter stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Repetitive Peak Reverse Current		I _{RRM}	V _{RRM} = 800 V	—	—	50	μA
Peak Forward Voltage		V _{FM}	I _{FM} = 30 A	—	1.05	1.20	V
Peak One Cycle Surge Forward Current		I _{FSM}	50 Hz sine-half-wave	400	—	—	A
Thermal Resistance		R _{th (j-c)}	—	—	—	1.56	°C / W

c. Brake stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current		I_{GES}	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0$	—	—	± 500	nA	
Collector Cut-Off Current		I_{CES}	$V_{CE} = 600\text{ V}, V_{GE} = 0$	—	—	1.0	mA	
Reverse Current		I_R	$V_R = 600\text{ V}$	—	—	1.0	mA	
Gate-Emitter Cut-Off Voltage		$V_{GE(\text{off})}$	$I_C = 5\text{ mA}, V_{CE} = 5\text{ V}$	5.0	—	8.0	V	
Collector-Emitter Saturation Voltage		$V_{CE(\text{sat})}$	$I_C = 50\text{ A}$	$T_j = 25^\circ\text{C}$	—	2.3	2.8	V
			$V_{GE} = 15\text{ V}$	$T_j = 125^\circ\text{C}$	—	—	—	
Input Capacitance		C_{ies}	$V_{CE} = 10\text{ V}, V_{GE} = 0,$ $f = 1\text{ MHz}$	—	—	—	pF	
Switching Time	Rise Time	t_r	$V_{CC} = 600\text{ V}$ $I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 24\ \Omega$ (Note 1)	—	0.10	0.20	μs	
	Turn-On Time	t_{on}		—	0.25	0.50		
	Fall Time	t_f		—	0.15	0.30		
	Turn-Off Time	t_{off}		—	0.50	0.80		
Forward Voltage		V_F	$I_F = 50\text{ A}, V_{GE} = 0$	—	2.0	2.8	V	
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	0.6	$^\circ\text{C/W}$	
			Diode	—	—	1.5		

d. Thermistor

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Zero-power Resistance	R_{25}	$I_{TM} = 0.2\text{ mA}, T_c = 25^\circ\text{C}$	17.31	20	23.14	k Ω
B Value	$B_{25/85}$	$T_c = 25^\circ\text{C} / T_c = 85^\circ\text{C}$	—	3760	—	K

(Note 1) Switching Time Test Circuit & Timing Chart

