

TENTATIVE TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

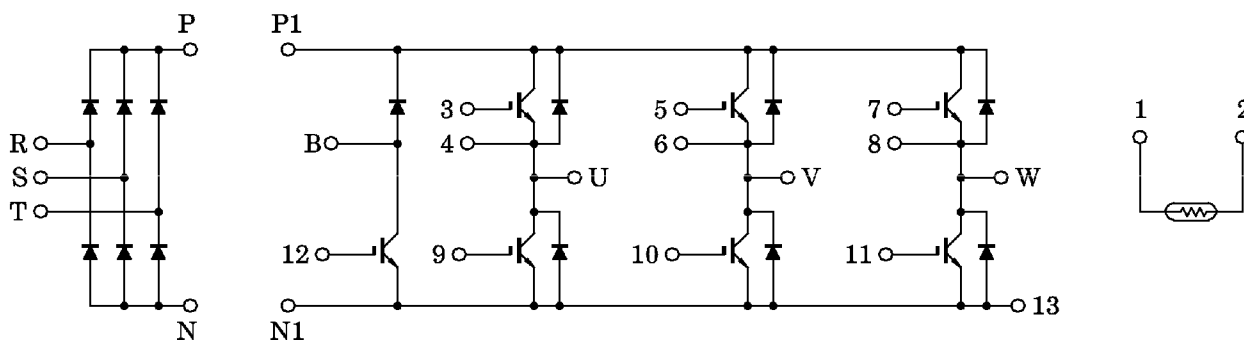
MIG20J906E, MIG20J906EA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter and Brake Power Circuits and Thermistor in One Package.
- Output (Inverter Stage) : 3 ϕ 20 A / 600 V IGBT
- Input (Converter Stage) : 3 ϕ 30 A / 800 V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Outline
 - MIG20J906E : 2-108E5A
 - MIG20J906EA : 2-108E6A
- Weight : 190 g

EQUIVALENT CIRCUIT



961001EAA1

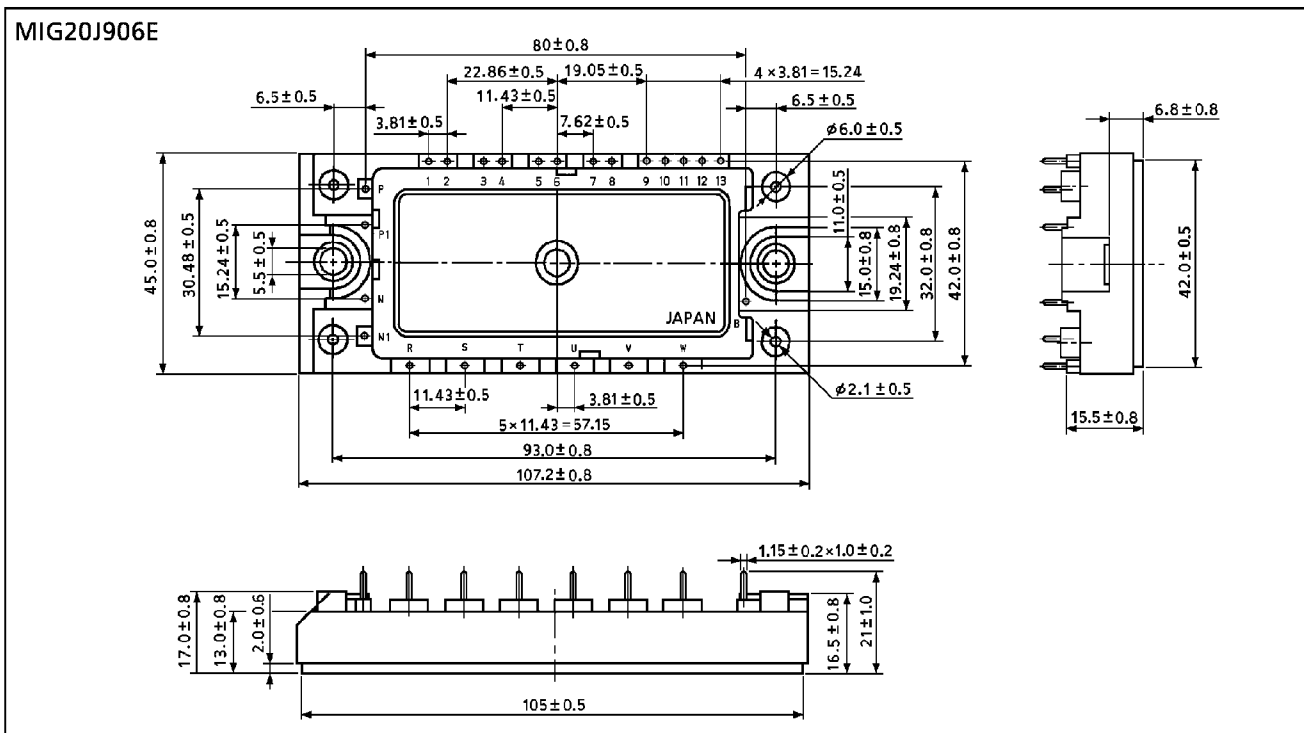
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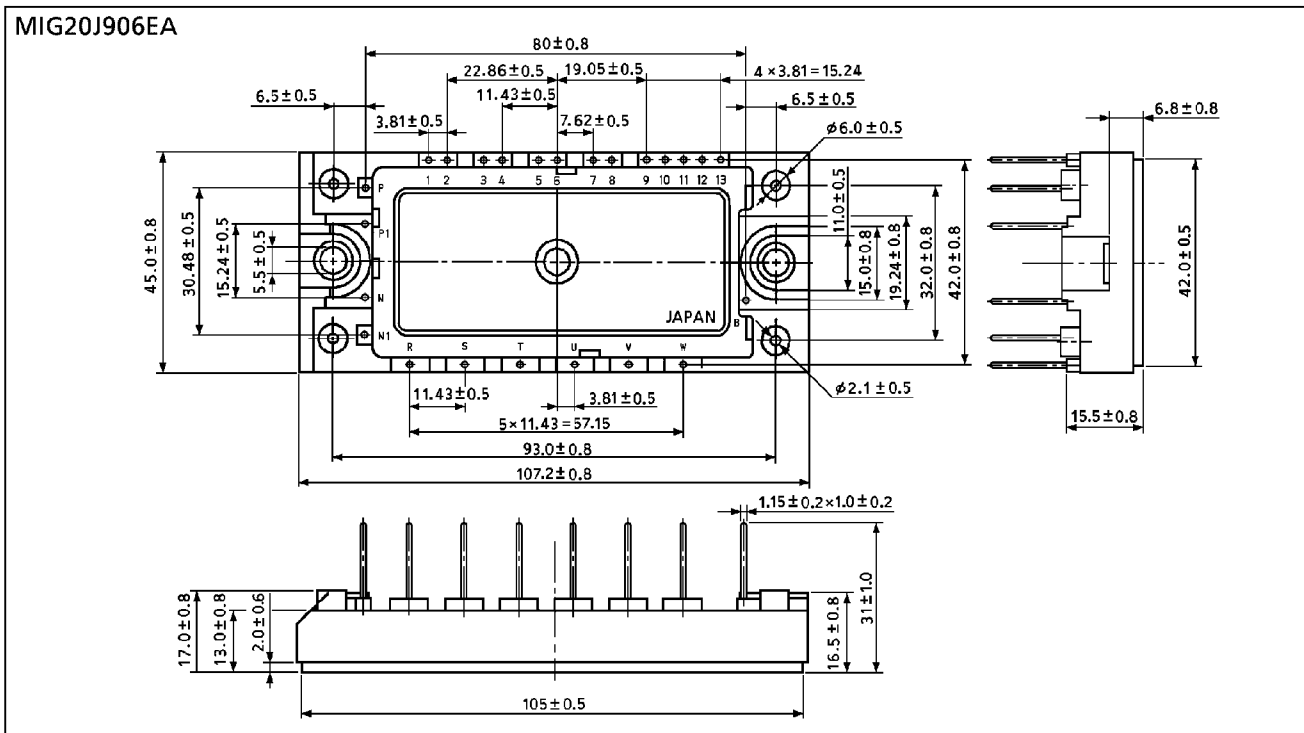
Package Dimension

Unit : mm



2-108E5A

Unit : mm



2-108E6A

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	25 / 20	A	(25°C / 40°C)	
		1 ms	I _{CP}	50 / 40	A	(25°C / 40°C)	
	Forward Current	DC	I _F	20	A		
		1 ms	I _{FM}	40	A		
Collector Power Dissipation (T _c = 25°C)		P _C	90	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	25 / 20	A	(25°C / 40°C)
			1 ms	I _{CP}	50 / 40	A	(25°C / 40°C)
	Collector Power Dissipation (T _c = 25°C)		P _C	90	W		
	FWD	Reverse Voltage		V _R	600	V	
		Forward Current	DC	I _F	20	A	
1 ms			I _{FM}	40	A		
Module	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 = 2 mA, V _{CE} = 5 V	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		V _{CE (sat)}	I _C = 20 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 I _C = 20 A V _{GE} = ±15 V R _G = 62 Ω (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 = 20 A, V _{GE} = 0	—	2.0	2.8	V
Reverse Recovery Time		t _{rr}	I _F = 20 A, V _{GE} = -10 V, di/dt = 100 A/μs	—	0.08	0.15	μs
Thermal Resistance		R _{th (j-c)}	Transistor	—	—	1.39	°C/W
			Diode	—	—	2.6	

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		$V_{GE}(\text{off})$	$I_C = 2\text{ mA}, V_{CE} = 5\text{ V}$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE}(\text{sat})$	$I_C = 20\text{ A}$	—	2.3	2.8	V
			$V_{GE} = 15\text{ V}$	—	—	—	
Input Capacitance		C_{ies}	$V_{CE} = 10\text{ V}, V_{GE} = 0,$ $f = 1\text{ MHz}$	—	1850	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 600\text{ V}$	—	0.10	0.20	μs
	Turn-On Time	t_{on}	$I_C = 20\text{ A}$	—	0.25	0.50	
	Fall Time	t_f	$V_{GE} = \pm 15\text{ V}$	—	0.15	0.30	
	Turn-Off Time	t_{off}	$R_G = 62\ \Omega$ (Note 1)	—	0.50	0.80	
Forward Voltage		V_F	$I_F = 20\text{ A}, V_{GE} = 0$	—	2.0	2.8	V
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	1.39	$^{\circ}\text{C} / \text{W}$
			Diode	—	—	2.6	

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	$\text{k}\Omega$
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

