

TENTATIVE TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

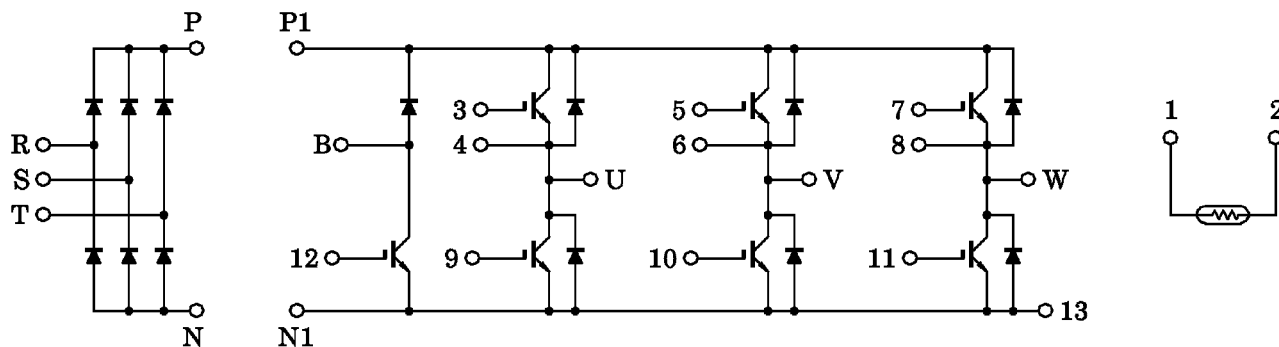
# MIG20J906H, MIG20J906HA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter and Brake Power Circuits and Thermistor in One Package.
- Output (Inverter Stage)  
: 3φ 20A / 600V IGBT
- Input (Converter Stage)  
: 3φ 30A / 800V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Outline  
MIG20J906H : 2-108E5A  
MIG20J906HA : 2-108E6A
- Weight : 190g

EQUIVALENT CIRCUIT



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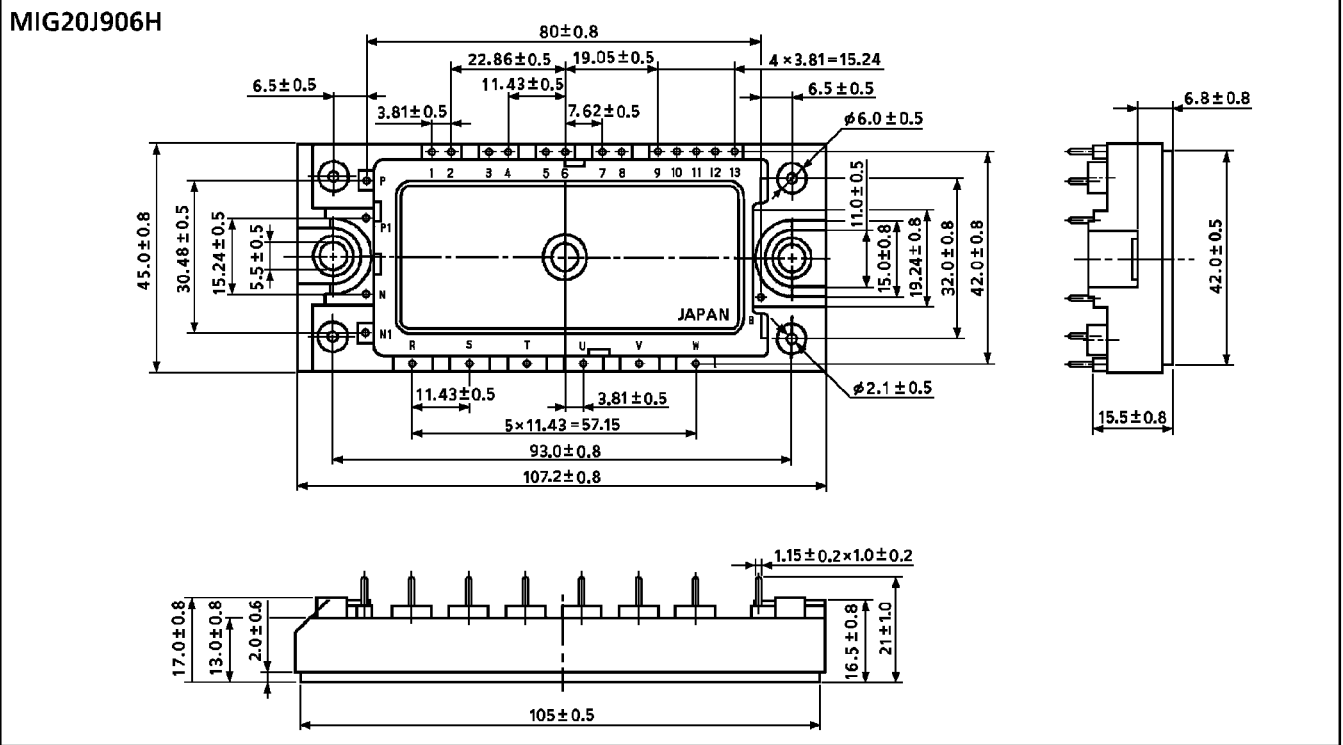
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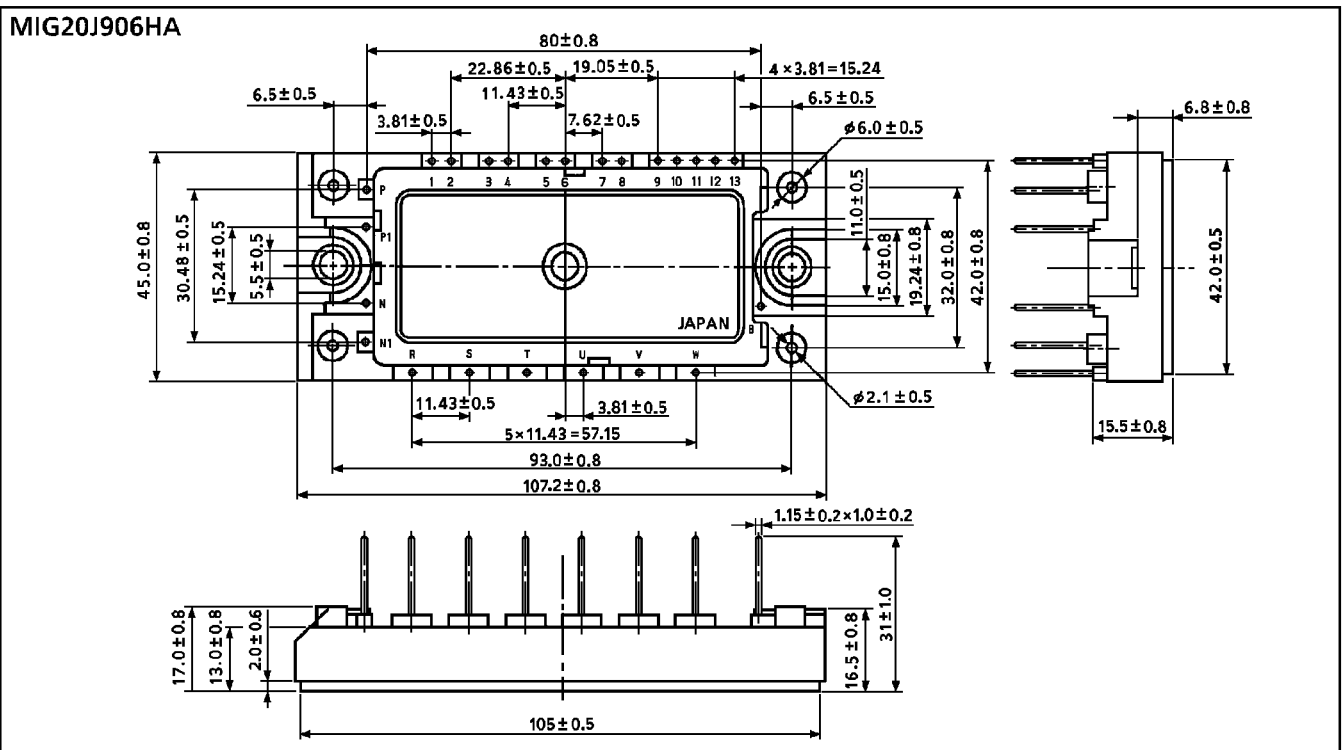
Package Dimension

Unit : mm



2-108E5A

Unit : mm



2-108E6A

MAXIMUM RATINGS (Ta = 25°C)

STAGE	CHARACTERISTIC		SYMBOL	RATING	UNIT		
Inverter	Collector-Emitter Voltage		V <sub>CES</sub>	600	V		
	Gate-Emitter Voltage		V <sub>GES</sub>	±20	V		
	Collector Current	DC	I <sub>C</sub>	25 / 20	A	(25°C / 40°C)	
		1ms	I <sub>CP</sub>	50 / 40	A	(25°C / 40°C)	
	Forward Current	DC	I <sub>F</sub>	20	A		
		1ms	I <sub>FM</sub>	40	A		
Collector Power Dissipation (Tc = 25°C)		P <sub>C</sub>	90	W			
Converter	Repetitive Peak Reverse Voltage		V <sub>RRM</sub>	800	V		
	Average Output Rectified Current		I <sub>O</sub>	30	A		
	Peak One Cycle Surge Forward Current (50Hz, Non-Repetitive)		I <sub>FSM</sub>	400	A		
Brake	IGBT	Collector-Emitter Voltage		V <sub>CES</sub>	600	V	
		Gate-Emitter Voltage		V <sub>GES</sub>	±20	V	
		Collector Current	DC	I <sub>C</sub>	25 / 20	A	(25°C / 40°C)
			1ms	I <sub>CP</sub>	50 / 40	A	(25°C / 40°C)
	Collector Power Dissipation (Tc = 25°C)		P <sub>C</sub>	90	W		
	FWD	Reverse Voltage		V <sub>R</sub>	600	V	
		Forward Current	DC	I <sub>F</sub>	20	A	
1ms			I <sub>FM</sub>	40	A		
Module	Junction Temperature		T <sub>j</sub>	150	°C		
	Storage Temperature Range		T <sub>stg</sub>	-40~125	°C		
	Isolation Voltage		V <sub>Isol</sub>	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	$I_{GES}$	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	$\pm 500$	nA	
Collector Cut-Off Current	$I_{CES}$	$V_{CE} = 600V, V_{GE} = 0$	—	—	1.0	mA	
Gate-Emitter Cut-Off Voltage	$V_{GE}(\text{off})$	$I_C = 2mA, V_{CE} = 5V$	5.0	—	8.0	V	
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C = 20A$	—	2.1	2.7	V	
		$V_{GE} = 15V$		2.2			2.8
Input Capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0, f = 1MHz$	—	1850	—	pF	
Switching Time	Rise Time	$t_r$	$V_{CC} = 300V$ $I_C = 20A$ $V_{GE} = \pm 15V$ $R_G = 62\Omega$  (Note 1)	—	0.10	0.20	$\mu s$
	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	$V_F$	$I_F = 20A, V_{GE} = 0$	—	2.0	2.8	V	
Reverse Recovery Time	$t_{rr}$	$I_F = 20A, V_{GE} = -10V,$ $di/dt = 100A/\mu s$	—	0.08	0.15	$\mu s$	
Thermal Resistance	$R_{th(j-c)}$	Transistor	—	—	1.39	$^{\circ}C/W$	
		Diode	—	—	2.6		

## b. Converter stage

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Repetitive Peak Reverse Current	$I_{RRM}$	$V_{RRM} = 800V$	—	—	50	$\mu A$
Peak Forward Voltage	$V_{FM}$	$I_{FM} = 30A$	—	1.05	1.20	V
Peak One Cycle Surge Forward Current	$I_{FSM}$	50Hz sine-half-wave	400	—	—	A
Thermal Resistance	$R_{th(j-c)}$	—	—	—	1.56	$^{\circ}C/W$

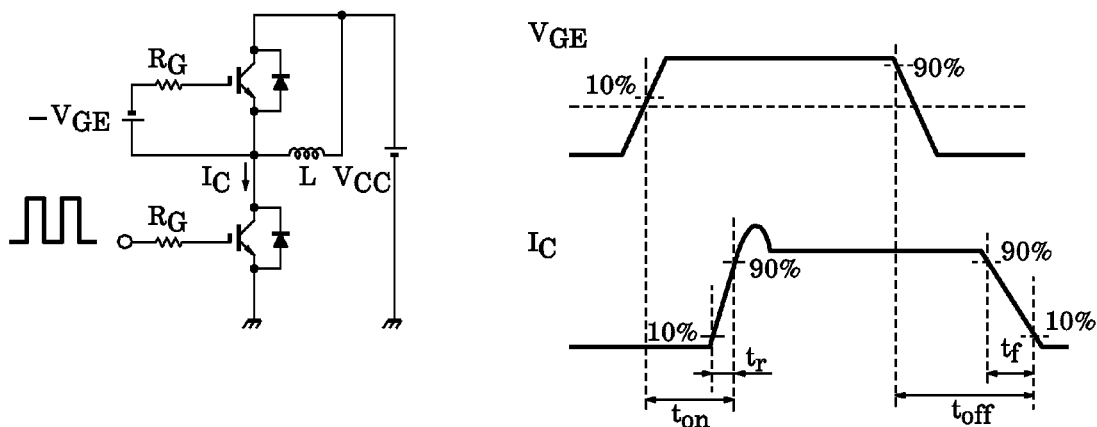
c. Brake stage

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current	$I_{GES}$	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector Cut-Off Current	$I_{CES}$	$V_{CE} = 600V, V_{GE} = 0$	—	—	1.0	mA
Reverse Current	$I_R$	$V_R = 600V$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage	$V_{GE} (off)$	$I_C = 2mA, V_{CE} = 5V$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage	$V_{CE} (sat)$	$I_C = 20A$	—	2.1	2.7	V
		$V_{GE} = 15V$	—	2.2	2.8	
Input Capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0, f = 1MHz$	—	1850	—	pF
Switching Time	Rise Time	$V_{CC} = 600V$ $I_C = 20A$ $V_{GE} = \pm 15V$ $R_G = 62\Omega$  (Note 1)	—	0.10	0.20	$\mu s$
	Turn-On Time		—	0.25	0.50	
	Fall Time		—	0.15	0.30	
	Turn-Off Time		—	0.50	0.80	
Forward Voltage	$V_F$	$I_F = 20A, V_{GE} = 0$	—	2.0	2.8	V
Thermal Resistance	$R_{th} (j-c)$	Transistor	—	—	1.39	$^{\circ}C / W$
		Diode	—	—	2.6	

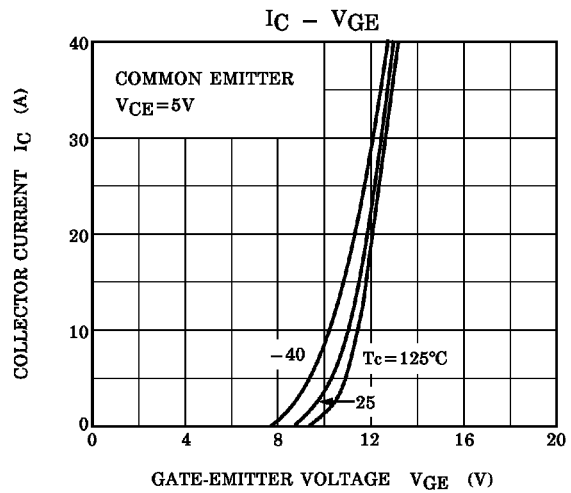
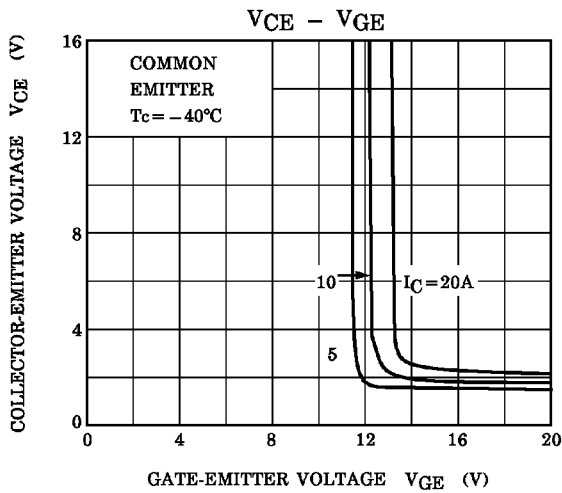
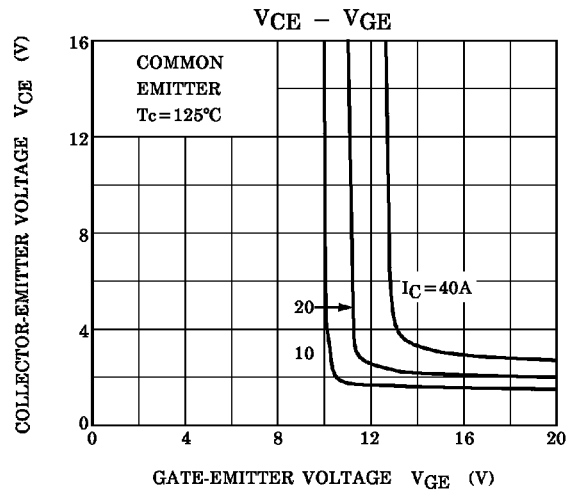
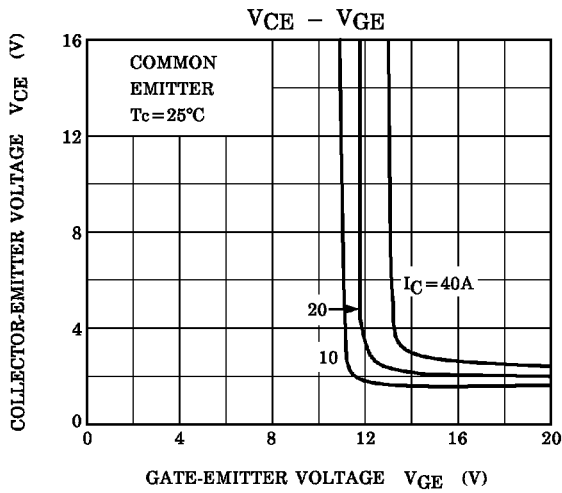
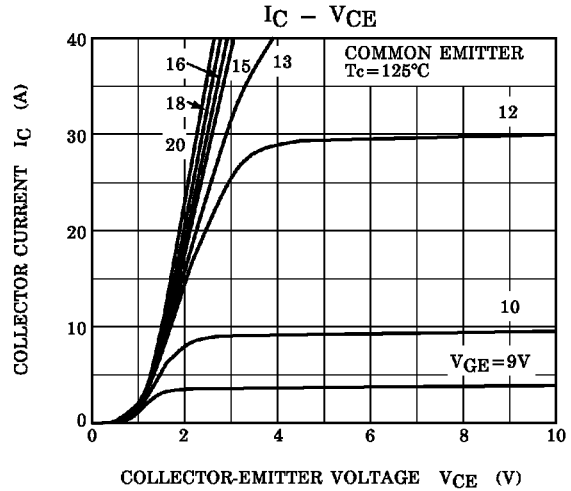
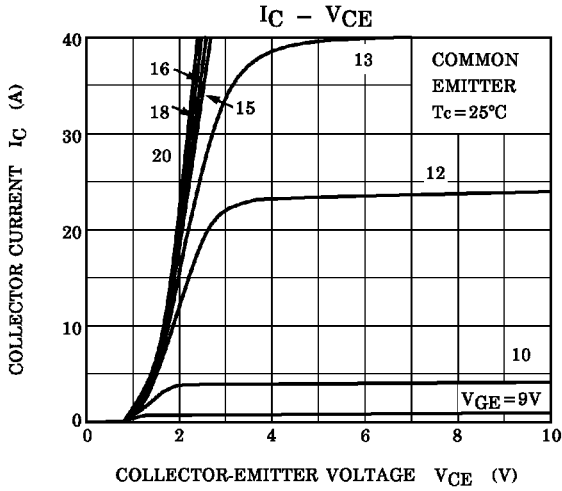
d. Thermistor

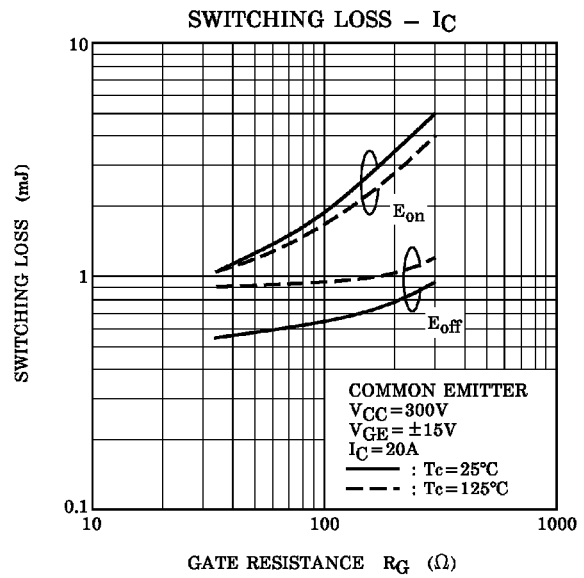
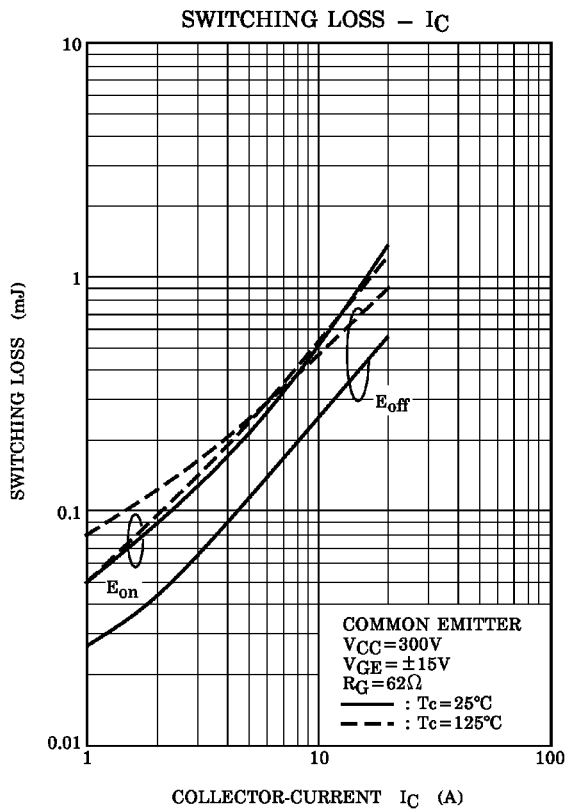
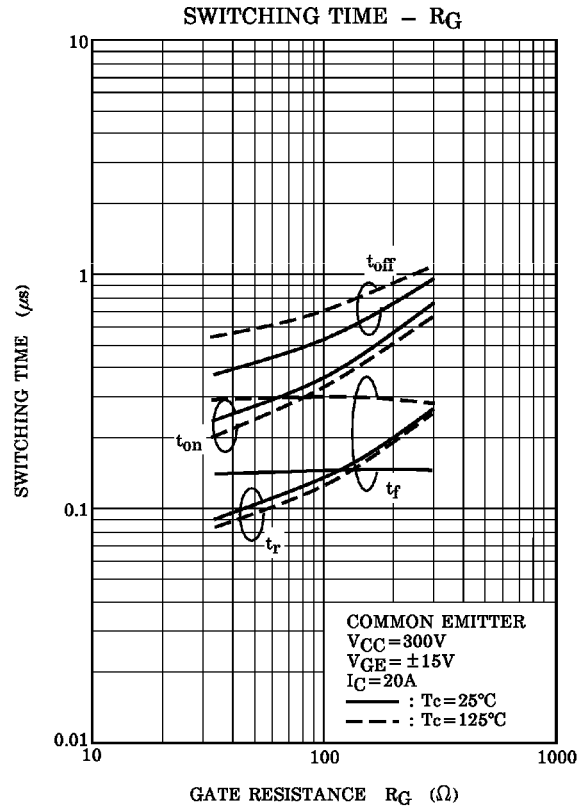
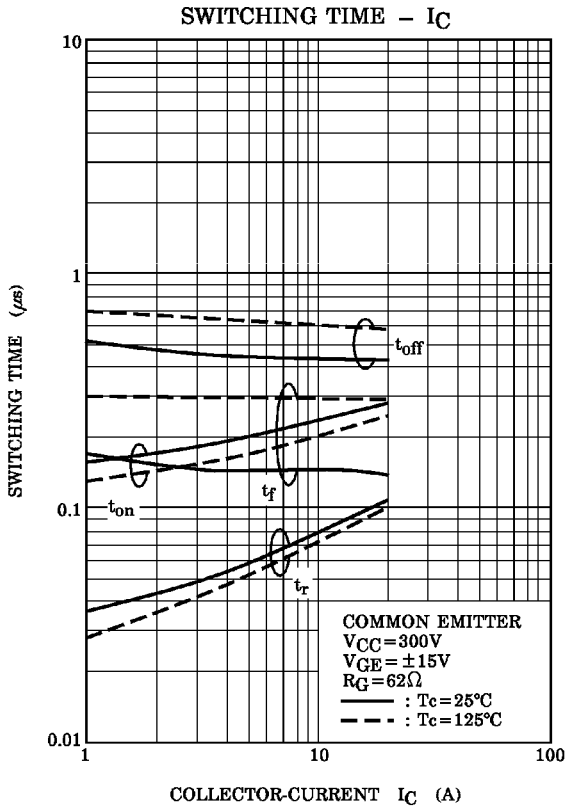
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Zero-power Resistance	$R_{25}$	$I_{TM} = 0.2mA, T_c = 25^{\circ}C$	17.31	20	23.14	k $\Omega$
B Value	$B_{25/85}$	$T_c = 25^{\circ}C / T_c = 85^{\circ}C$	—	3760	—	K

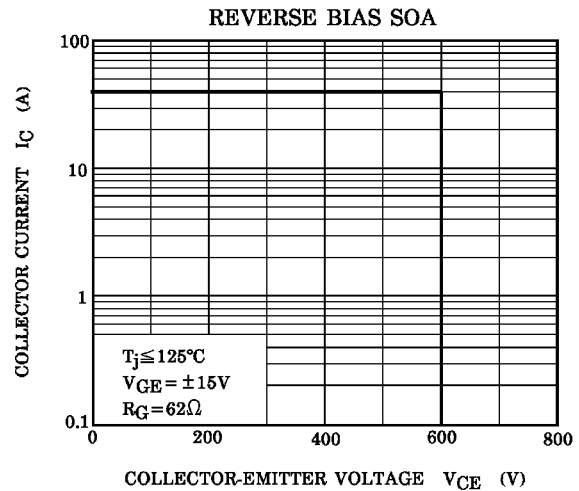
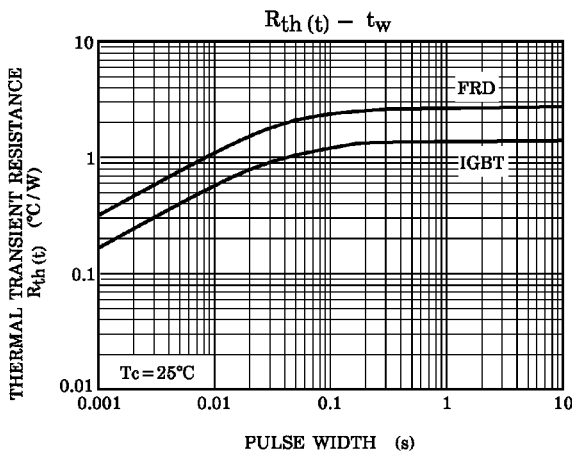
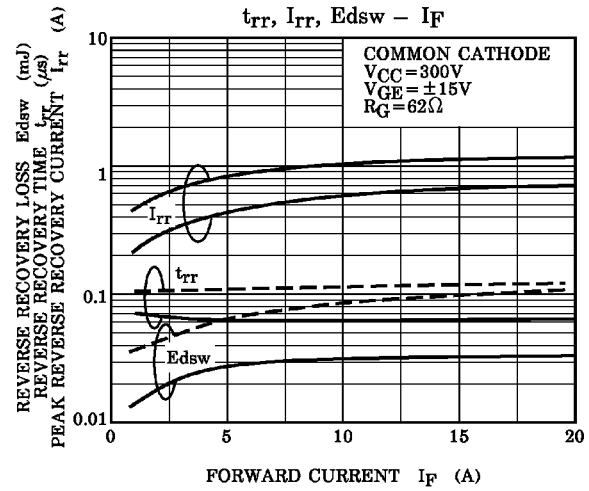
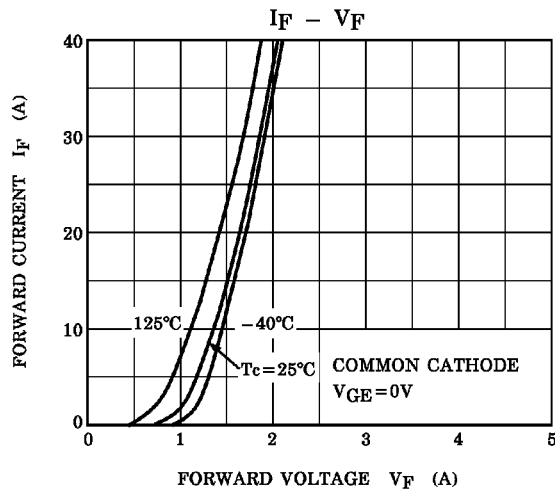
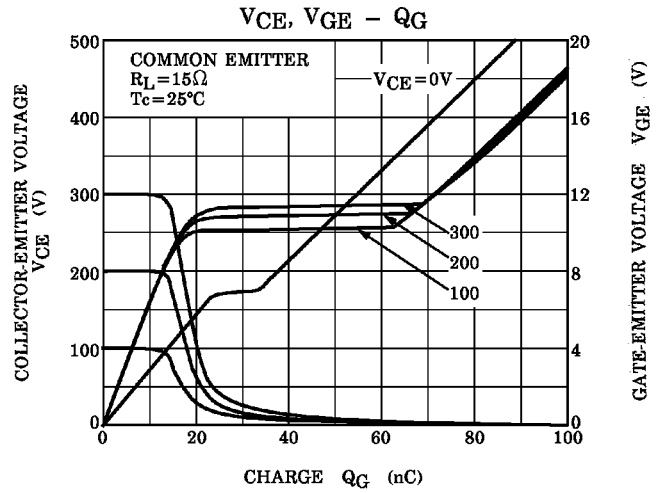
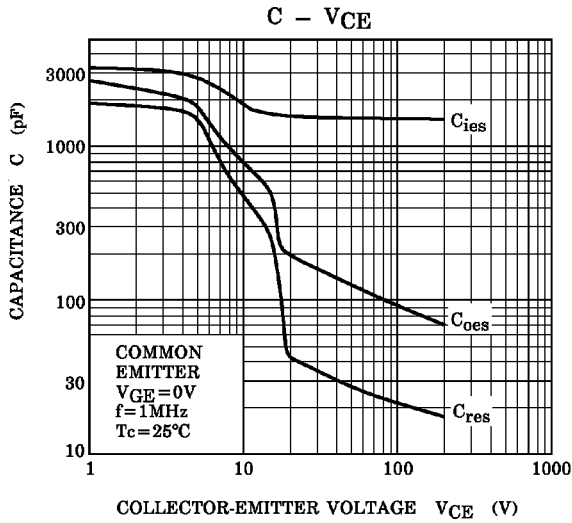
(Note 1) Switching Time Test Circuit & Timing Chart



a. Inverter stage/c. Brake stage









b. Converter stage

