

TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

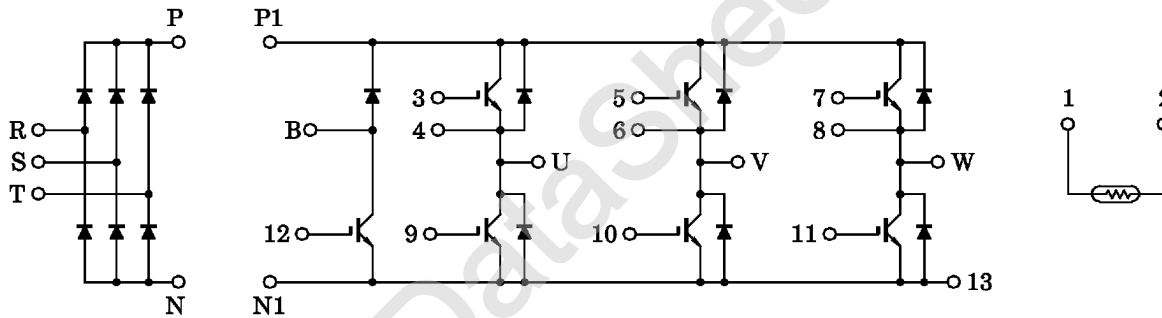
# MIG25Q906H, MIG25Q906HA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter and Brake Power Circuits and Thermistor in One Package.
- Output (Inverter Stage) : 3 $\phi$  25 A / 1200 V IGBT
- Input (Converter Stage) : 3 $\phi$  20 A / 1600 V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Weight : 190 g
- Outline
  - MIG25Q906H : 2-108E5A
  - MIG25Q906HA : 2-108E6A

**EQUIVALENT CIRCUIT**



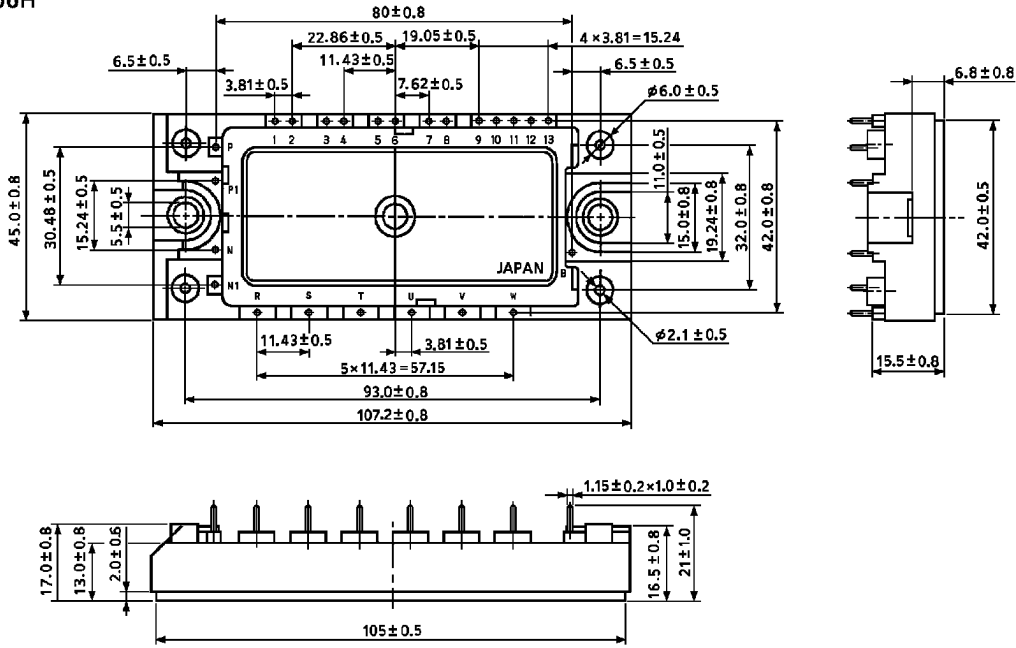
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Package Dimension

Unit : mm

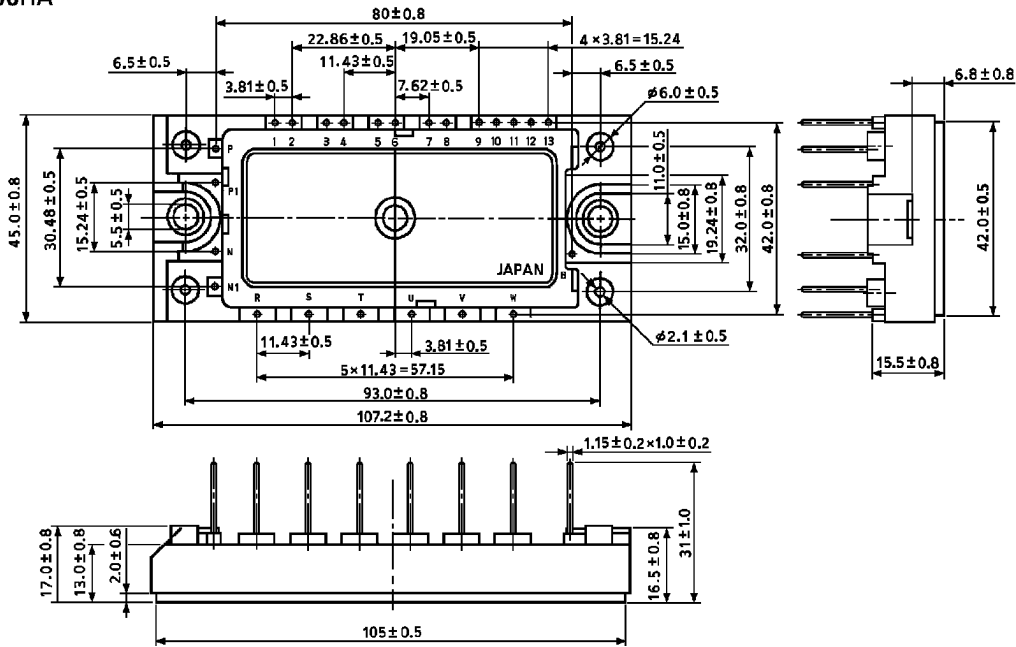
MIG25Q906H



2-108E5A

Unit : mm

MIG25Q906HA



2-108E6A

MAXIMUM RATINGS (Ta = 25°C)

STAGE		CHARACTERISTIC		SYMBOL	RATING	UNIT	
Inverter	Collector-Emitter Voltage			V <sub>CES</sub>	1200	V	
	Gate-Emitter Voltage			V <sub>GES</sub>	±20	V	
	Collector Current	DC		I <sub>C</sub>	35 / 25	A	
		1 ms		I <sub>CP</sub>	70 / 50	A	
	Forward Current	DC		I <sub>F</sub>	25	A	
		1 ms		I <sub>FM</sub>	50	A	
Collector Power Dissipation (Tc = 25°C)			P <sub>C</sub>	200	W		
Converter	Repetitive Peak Reverse Voltage			V <sub>RRM</sub>	1600	V	
	Average Output Rectified Current			I <sub>O</sub>	20	A	
	Peak One Cycle Surge Forward Current (50 Hz, Non-Repetitive)			I <sub>FSM</sub>	400	A	
Brake	IGBT	Collector-Emitter Voltage		V <sub>CES</sub>	1200	V	
		Gate-Emitter Voltage		V <sub>GES</sub>	±20	V	
		Collector Current	DC	I <sub>C</sub>	35 / 25	A	
			1 ms	I <sub>CP</sub>	70 / 50	A	
	Collector Power Dissipation (Tc = 25°C)			P <sub>C</sub>	200	W	
	FWD	Reverse Voltage			V <sub>R</sub>	1200	V
		Forward Current	DC	I <sub>F</sub>	25	A	
			1 ms	I <sub>FM</sub>	50	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	

(25°C / 80°C)  
(25°C / 80°C)

(25°C / 80°C)  
(25°C / 80°C)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

a. Inverter stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		IGES	VGE = ±20 V, VCE = 0	—	—	±500	nA
Collector Cut-Off Current		ICES	VCE = 1200 V, VGE = 0	—	—	0.5	mA
Gate-Emitter Cut-Off Voltage		VGE (off)	IC = 25 mA, VCE = 5 V	—	6.0	—	V
Collector-Emitter Saturation Voltage		VCE (sat)	IC = 25 A	—	2.8	3.2	V
			VGE = 15 V	—	3.1	3.7	
Input Capacitance		Cies	VCE = 10 V, VGE = 0, f = 1 MHz	—	2600	—	pF
Switching Time	Rise Time	tr	VCC = 600 V	—	0.07	0.15	μs
	Turn-On Time	ton	IC = 25 A	—	0.15	0.30	
	Fall Time	tf	VGE = ±15 V	—	0.07	0.10	
	Turn-Off Time	toff	RG = 51 Ω Tj = 125°C (Note 1)	—	0.60	0.90	
Forward Voltage		VF	IF = 25 A, VGE = 0	—	2.0	2.8	V
Reverse Recovery Time		trr	IF = 25 A, VGE = -10 V di / dt = 400 A / μs	—	0.10	0.25	μs
Thermal Resistance		Rth (j-c)	Transistor	—	—	0.6	°C / W
			Diode	—	—	1.0	

b. Converter stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Repetitive Peak Reverse Current		IRRM	VRRM = 1600 V	—	—	50	μA
Peak Forward Voltage		VFM	IFM = 20 A	—	1.05	1.20	V
Peak One Cycle Surge Forward Current		IFSM	50 Hz sine-half-wave	400	—	—	A
Thermal Resistance		Rth (j-c)	—	—	—	1.56	°C / W

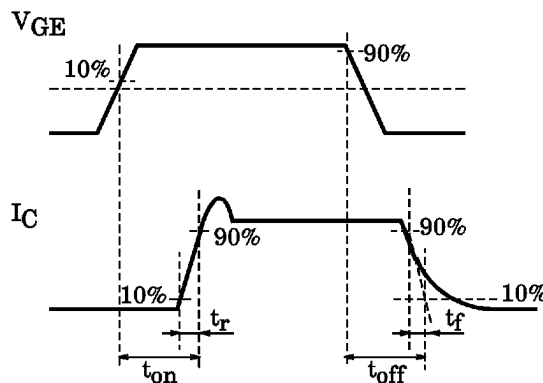
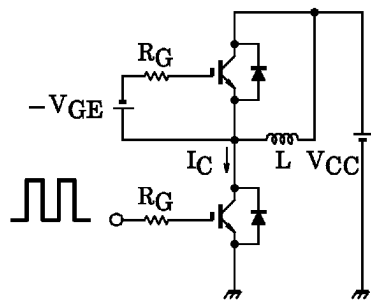
c. Brake stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GES}$	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector Cut-Off Current		$I_{CES}$	$V_{CE} = 1200\text{ V}, V_{GE} = 0$	—	—	0.5	mA
Reverse Current		$I_R$	$V_R = 1200\text{ V}$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		$V_{GE}(\text{off})$	$I_C = 25\text{ mA}, V_{CE} = 5\text{ V}$	—	6.0	—	V
Collector-Emitter Saturation Voltage		$V_{CE}(\text{sat})$	$I_C = 25\text{ A}$	—	2.8	3.2	V
			$V_{GE} = 15\text{ V}$	—	3.1	3.7	
Input Capacitance		$C_{ies}$	$V_{CE} = 10\text{ V}, V_{GE} = 0,$ $f = 1\text{ MHz}$	—	2600	—	pF
Switching Time	Rise Time	$t_r$	$V_{CC} = 600\text{ V}$	—	0.07	0.15	$\mu\text{s}$
	Turn-On Time	$t_{on}$	$I_C = 25\text{ A}$	—	0.15	0.30	
	Fall Time	$t_f$	$V_{GE} = \pm 15\text{ V}$	—	0.07	0.10	
	Turn-Off Time	$t_{off}$	$R_G = 51\ \Omega$ $T_j = 125^\circ\text{C}$ (Note 1)	—	0.60	0.90	
Forward Voltage		$V_F$	$I_F = 25\text{ A}, V_{GE} = 0$	—	2.0	2.8	V
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	0.6	$^\circ\text{C/W}$
			Diode	—	—	1.0	

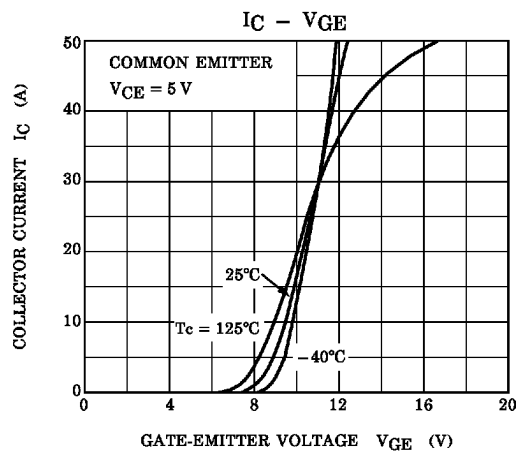
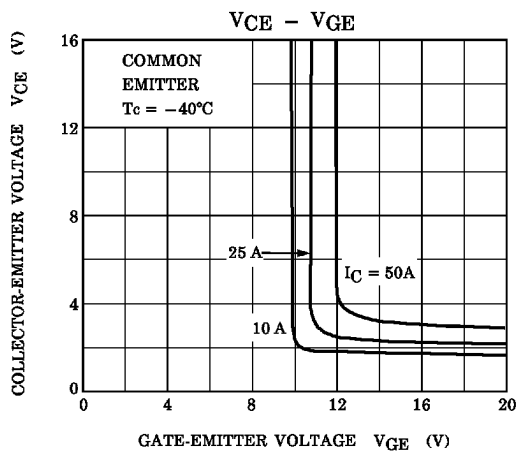
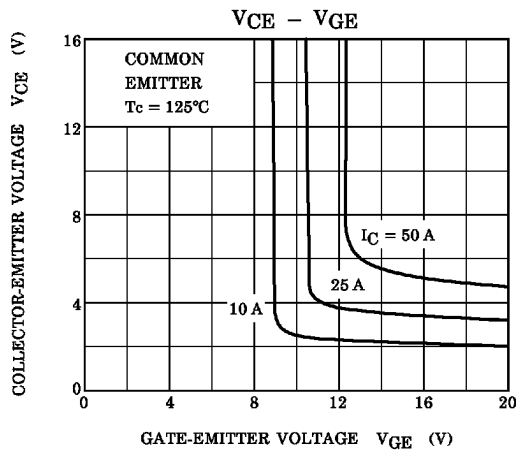
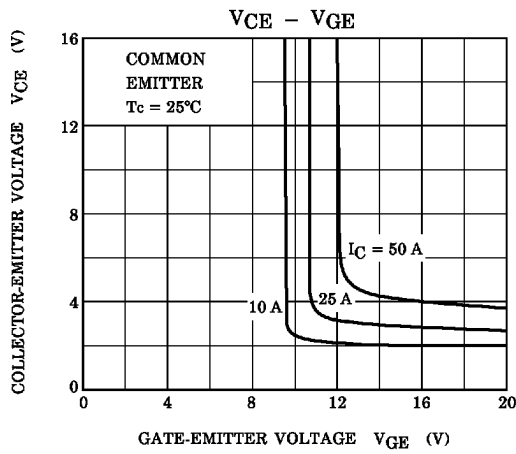
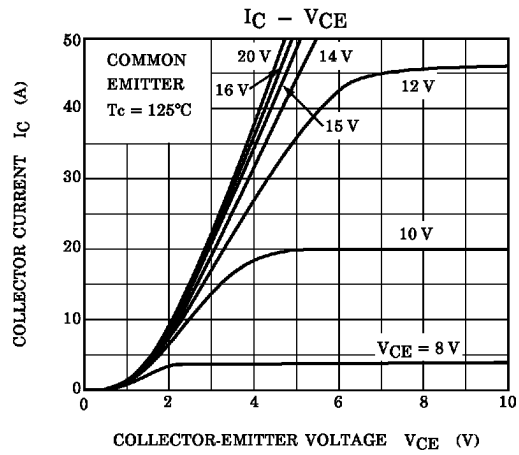
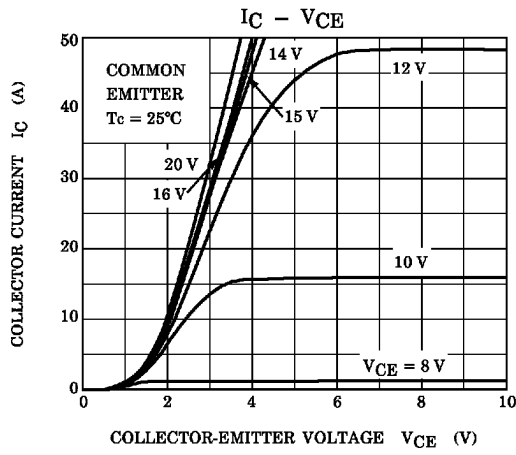
d. Thermistor

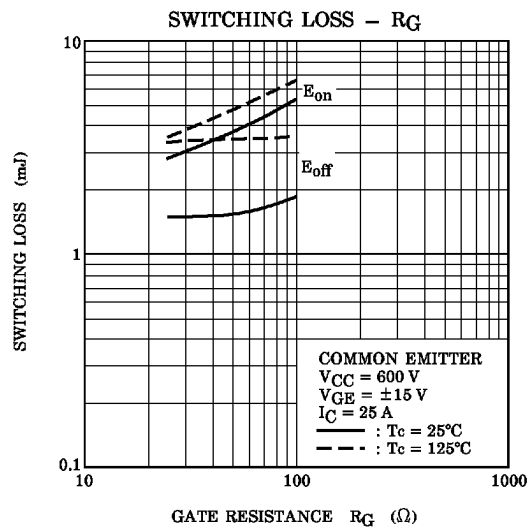
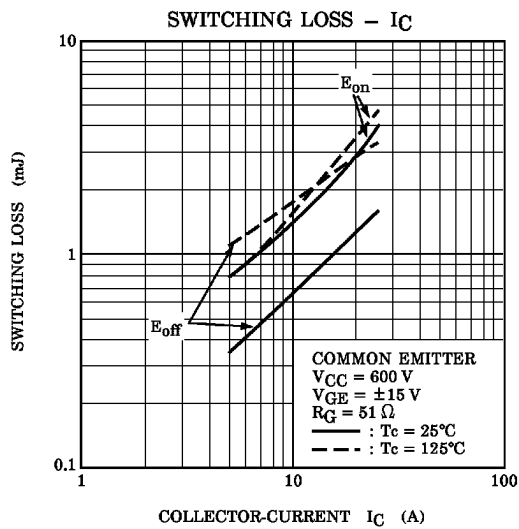
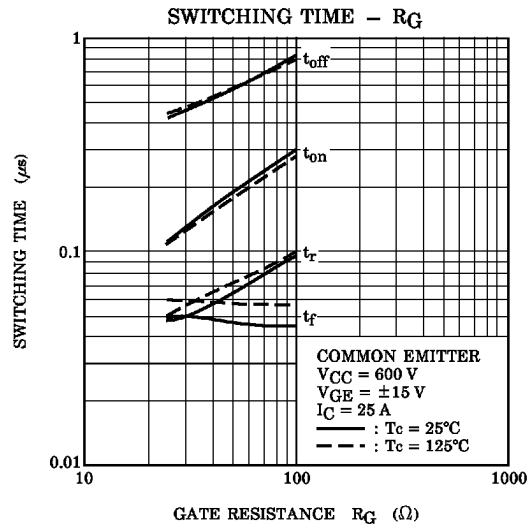
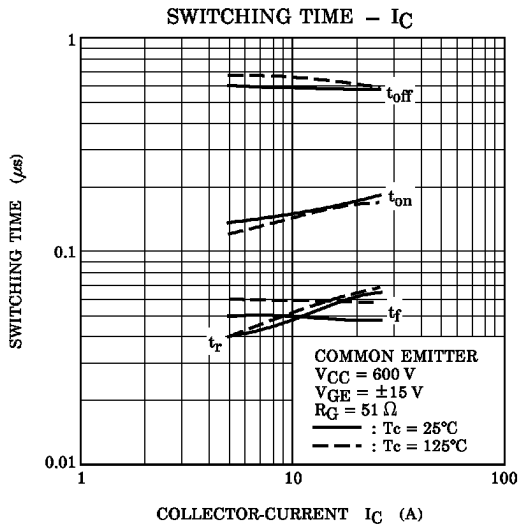
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Zero-power Resistance	$R_{25}$	$I_{TM} = 0.2\text{ mA}, T_c = 25^\circ\text{C}$	17.31	20	23.14	k $\Omega$
B Value	B25 / 85	$T_c = 25^\circ\text{C} / T_c = 85^\circ\text{C}$	—	3760	—	K

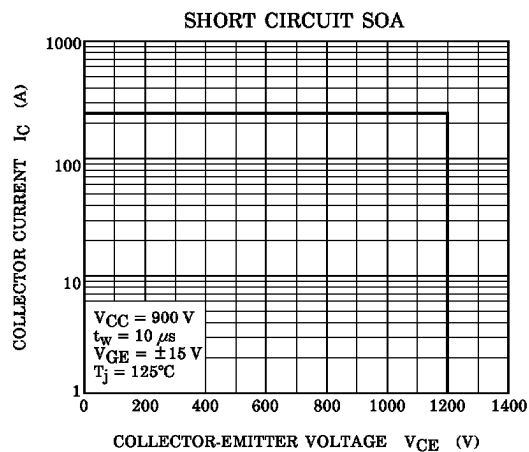
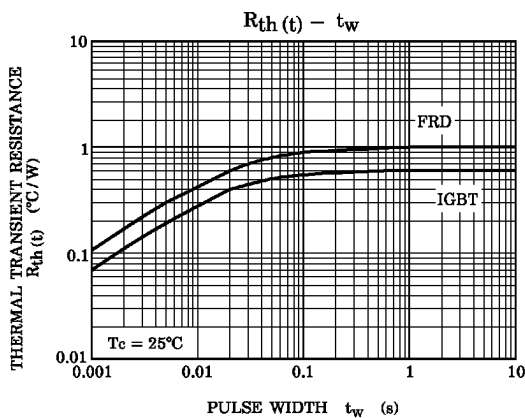
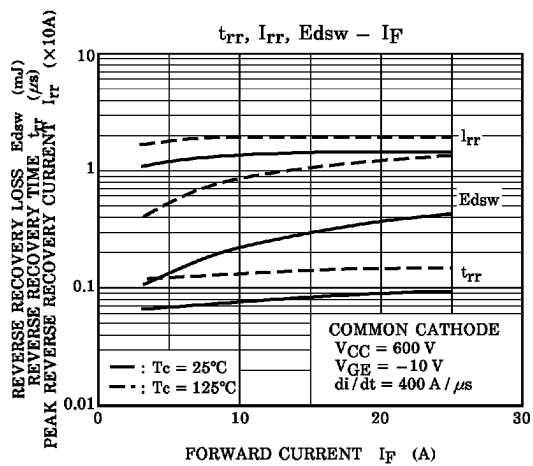
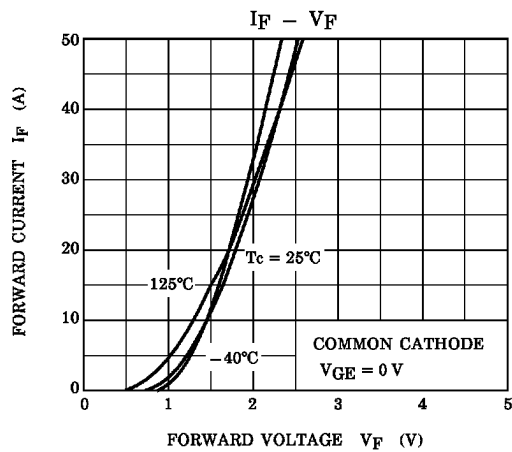
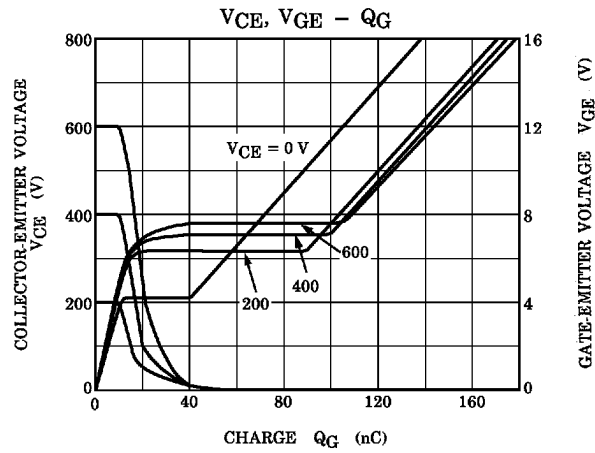
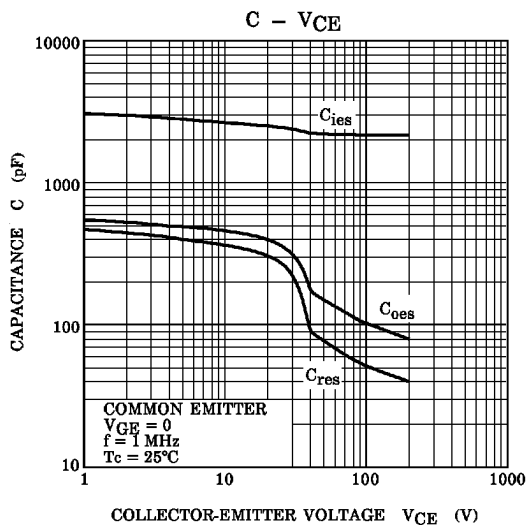
(Note 1) : Switching Time Test Circuit & Timing Chart



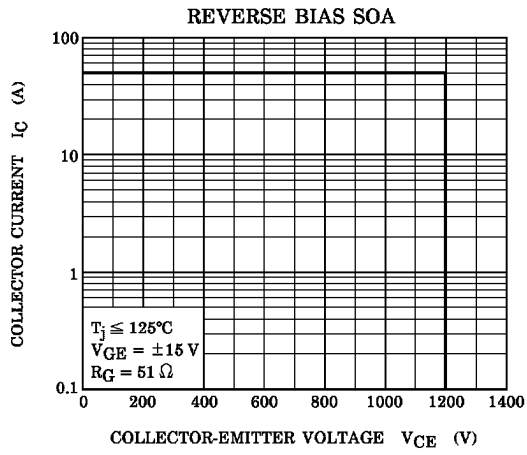
a. Inverter stage / c. Brake stage











**b. Converter stage**

