

TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

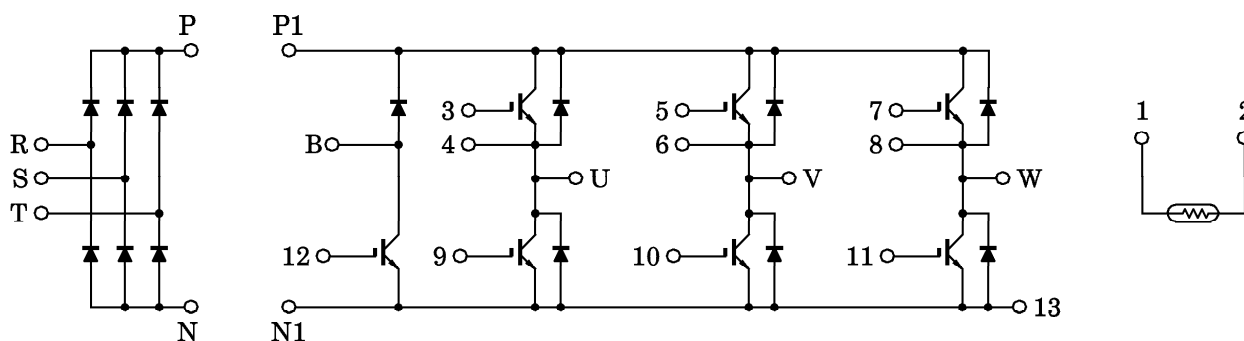
MIG30J906H, MIG30J906HA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter and Brake Power Circuits and Thermistor in One Package.
- Output (Inverter Stage) : 3 ϕ 30A / 600V IGBT
- Input (Converter Stage) : 3 ϕ 30A / 800V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Outline
 - MIG30J906H : 2-108E3A
 - MIG30J906HA : 2-108E4A
- Weight : 190g

EQUIVALENT CIRCUIT



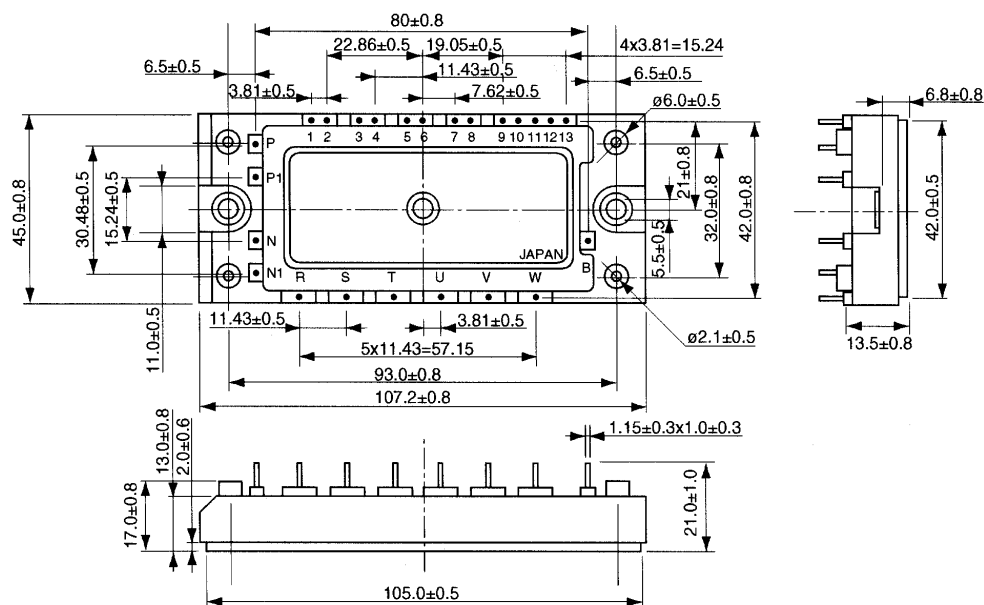
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Package Dimension

Unit : mm

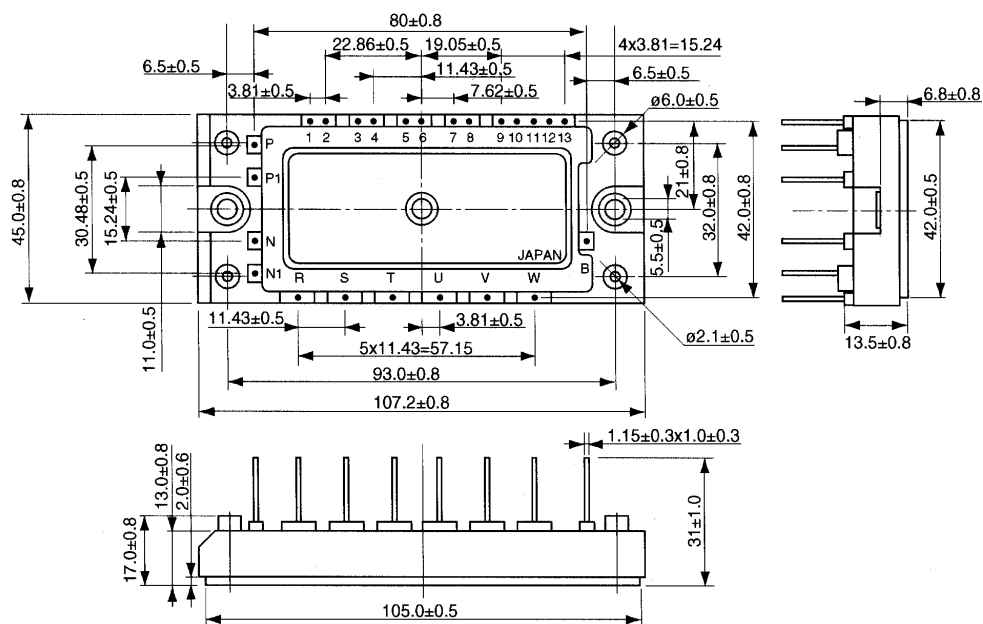
MIG30J906H



2-108E3A

Unit : mm

MIG30J906HA



2-108E4A

MAXIMUM RATINGS (Ta = 25°C)

STAGE		CHARACTERISTIC		SYMBOL	RATING	UNIT	
Inverter		Collector-Emitter Voltage		V _{CES}	600	V	(25°C / 40°C)
		Gate-Emitter Voltage		V _{GES}	±20	V	
		Collector Current	DC	I _C	35 / 30	A	
			1ms	I _{CP}	70 / 60	A	
		Forward Current	DC	I _F	30	A	
			1ms	I _{FM}	60	A	
		Collector Power Dissipation (T _c =25°C)		P _C	125	W	
Converter		Repetitive Peak Reverse Voltage		V _{RRM}	800	V	
		Average Output Rectified Current		I _O	30	A	
		Peak One Cycle Surge Forward Current (50Hz, Non-Repetitive)		I _{FSM}	400	A	
Brake	IGBT	Collector-Emitter Voltage		V _{CES}	600	V	(25°C / 40°C)
		Gate-Emitter Voltage		V _{GES}	±20	V	
		Collector Current	DC	I _C	35 / 30	A	
			1ms	I _{CP}	70 / 60	A	
		Collector Power Dissipation (T _c =25°C)		P _C	125	W	
	FWD	Reverse Voltage		V _R	600	V	
		Forward Current	DC	I _F	30	A	
			1ms	I _{FM}	60	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}	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	± 500	nA
Collector Cut-Off Current		I_{CES}	$V_{CE} = 600V, V_{GE} = 0$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		$V_{GE(off)}$	$I_C = 3mA, V_{CE} = 5V$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	$I_C = 30A$ $V_{GE} = 15V$	—	2.1	2.7	V
			$T_j = 25^\circ C$ $T_j = 125^\circ C$	—	2.2	2.8	
Input Capacitance		C_{ies}	$V_{CE} = 10V, V_{GE} = 0, f = 1MHz$	—	—	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 300V$ $I_C = 30A$ $V_{GE} = \pm 15V$ $R_G = 43\Omega$ (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	$I_F = 30A, V_{GE} = 0$	—	2.0	2.8	V
Reverse Recovery Time		t_{rr}	$I_F = 30A, V_{GE} = -10V$ $di/dt = 100A/\mu s$	—	0.08	0.15	μs
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	1.0	$^\circ C/W$
			Diode	—	—	2.6	

b. Converter stage

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Repetitive Peak Reverse Current	I_{RRM}	$V_{RRM} = 800V$	—	—	50	μA
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	$^\circ C/W$

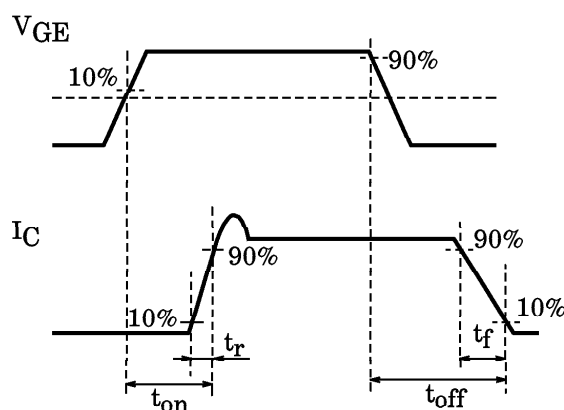
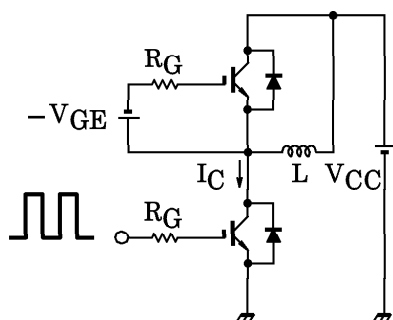
c. Brake stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GES}	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	± 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		$V_{GE} \text{ (off)}$	$I_C = 3mA, V_{CE} = 5V$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE} \text{ (sat)}$	$I_C = 30A$ $V_{GE} = 15V$	—	2.1	2.7	V
			$T_j = 25^\circ C$ $T_j = 125^\circ C$	—	2.2	2.8	
Input Capacitance		C_{ies}	$V_{CE} = 10V, V_{GE} = 0, f = 1MHz$	—	—	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 300V$ $I_C = 30A$ $V_{GE} = \pm 15V$ $R_G = 43\Omega$ (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	$I_F = 30A, V_{GE} = 0$	—	2.0	2.8	V
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	1.0	$^\circ C / W$
			Diode	—	—	2.6	

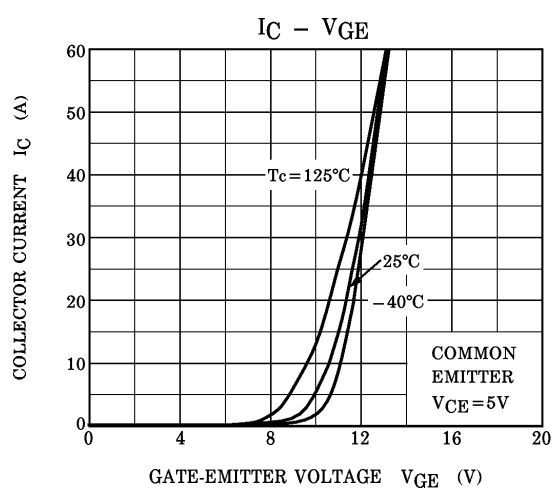
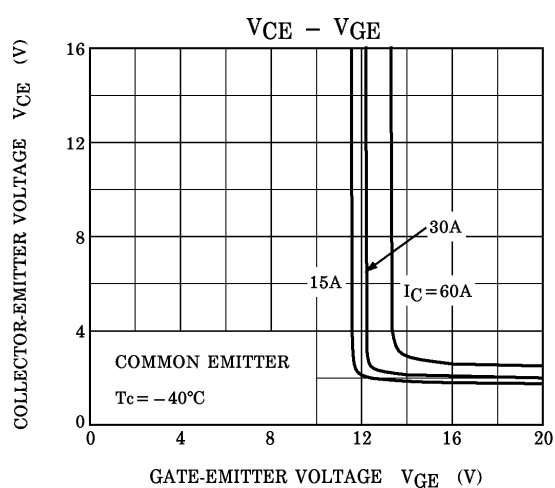
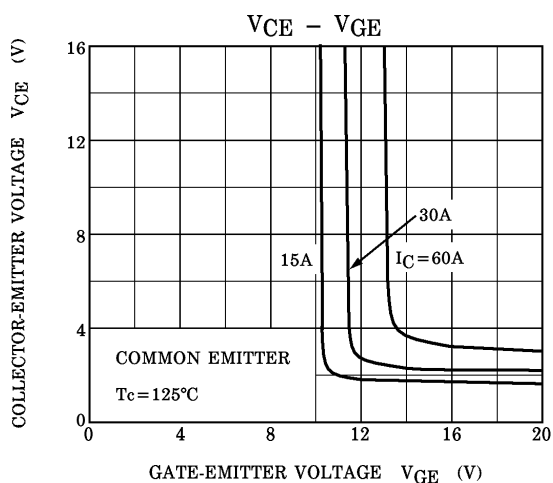
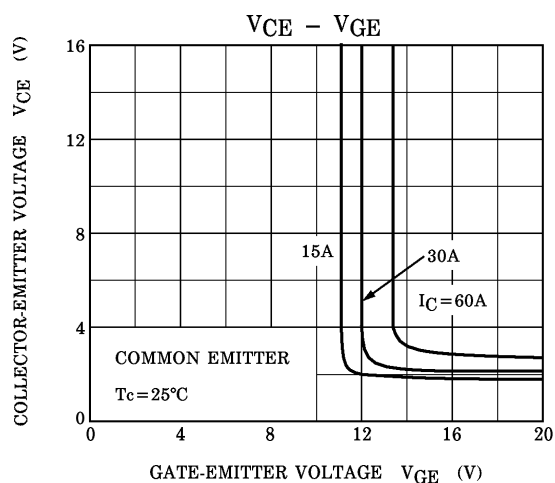
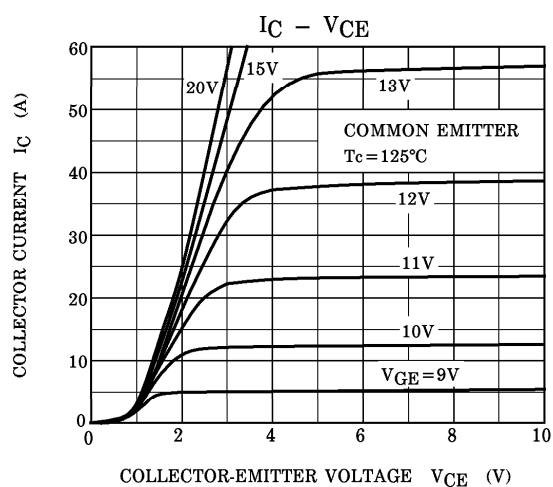
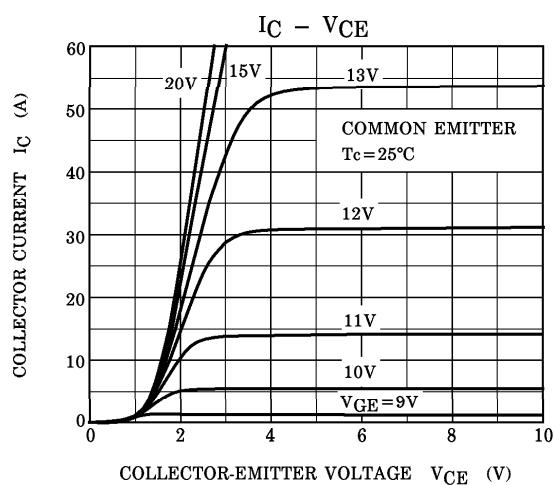
d. Thermistor

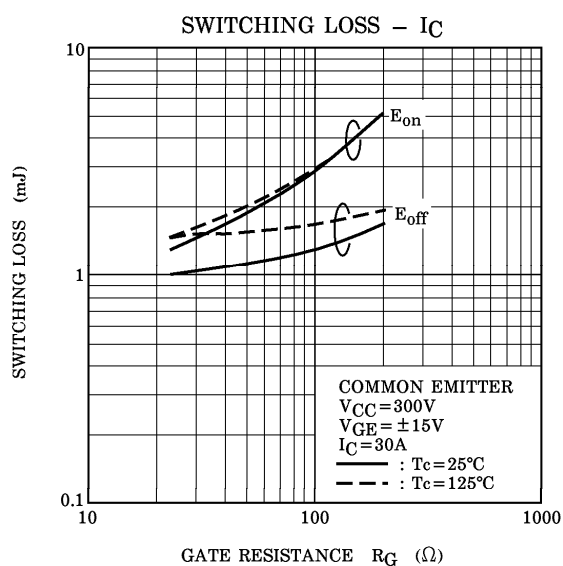
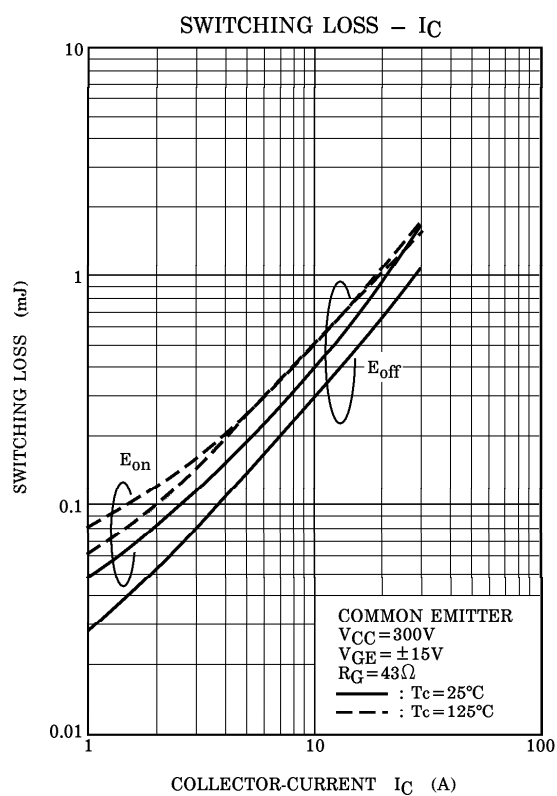
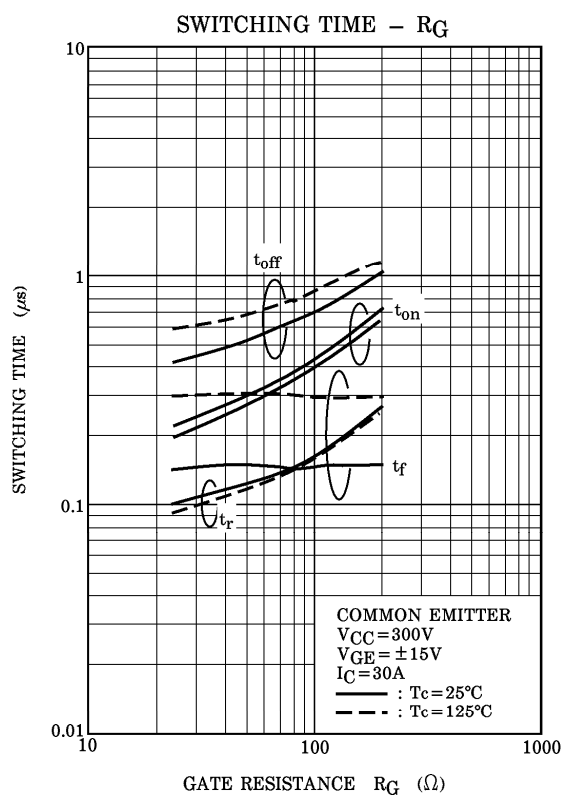
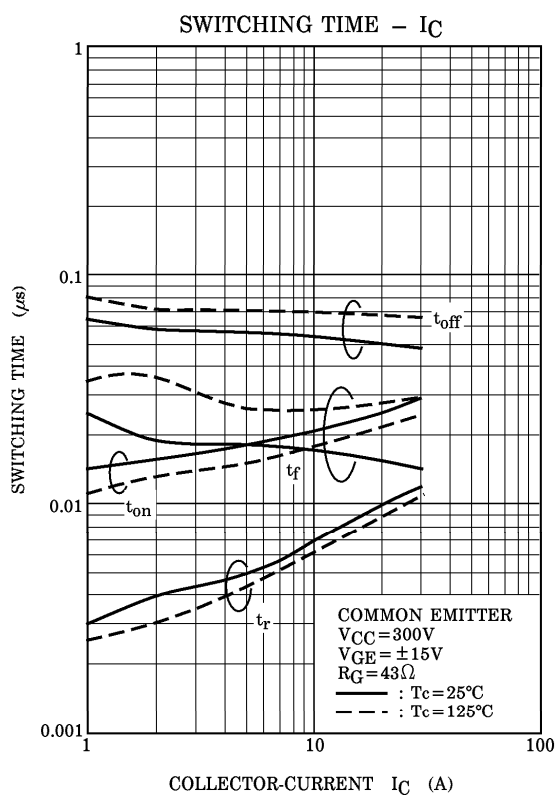
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Zero-power Resistance	R_{25}	$I_{TM} = 0.2mA, T_c = 25^\circ C$	17.31	20	23.14	$k\Omega$
B Value	$B_{25/85}$	$T_c = 25^\circ C / T_c = 85^\circ C$	—	3760	—	K

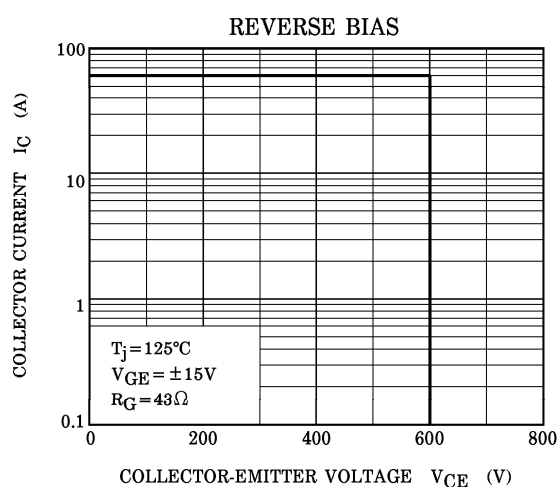
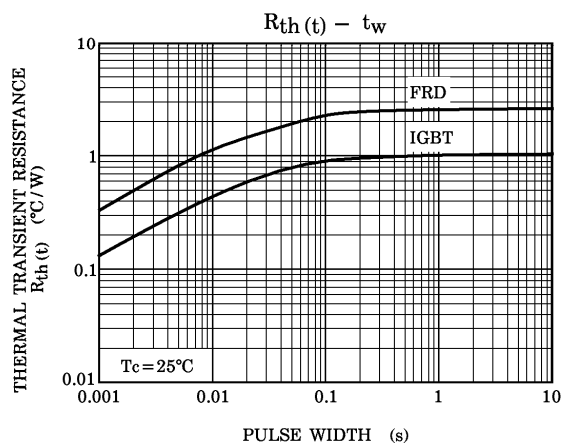
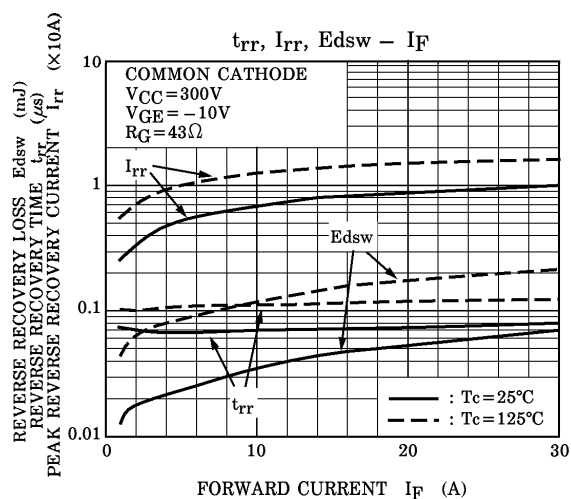
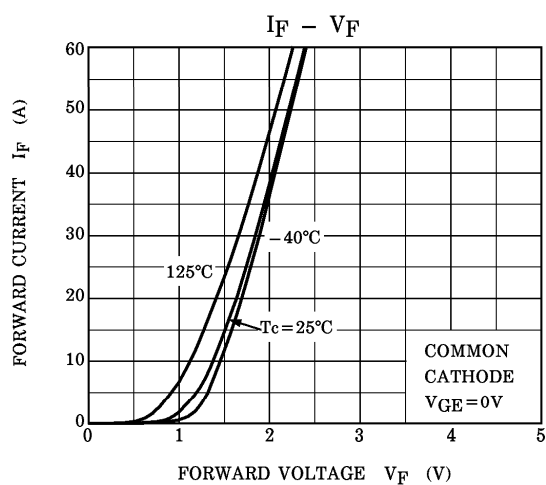
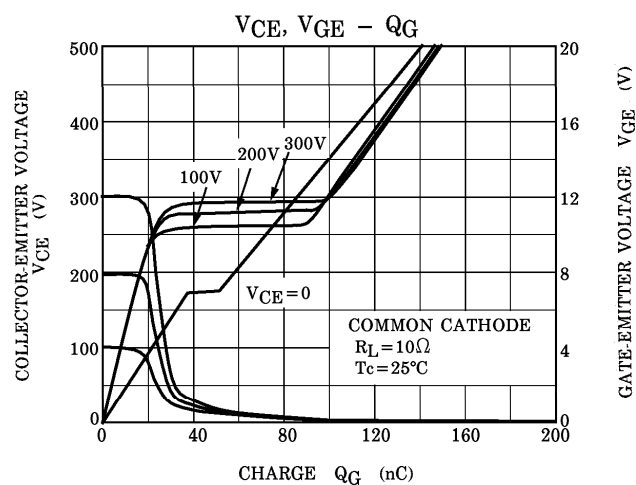
(Note 1) Switching Time Test Circuit & Timing Chart



a. Inverter stage / c. Brake stage







b. Converter stage

