

TENTATIVE

TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

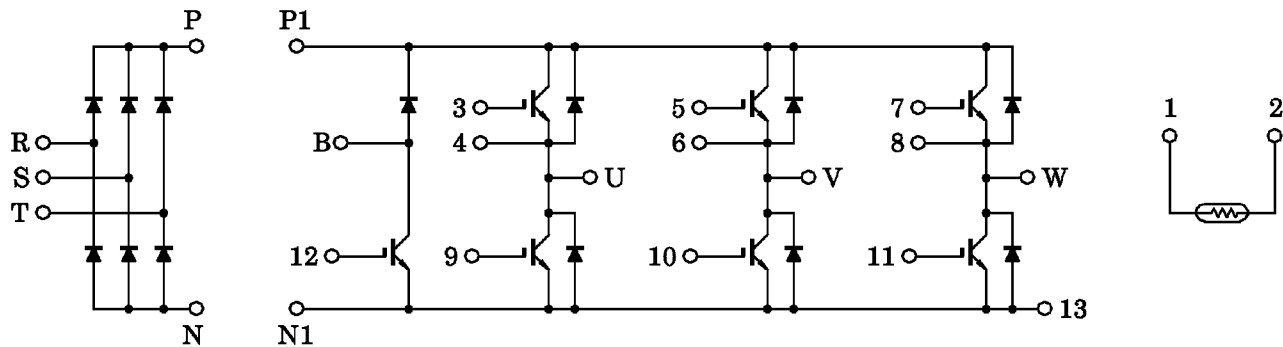
MIG20J906H, MIG20J906HA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

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

EQUIVALENT CIRCUIT



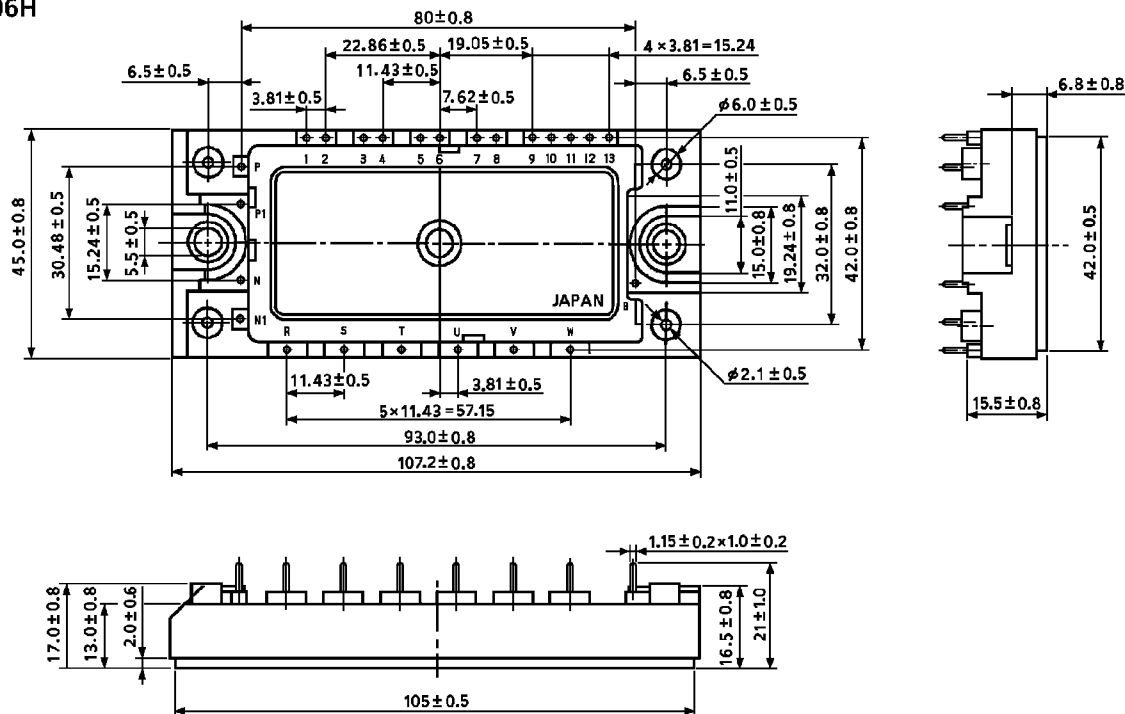
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Package Dimension

Unit : mm

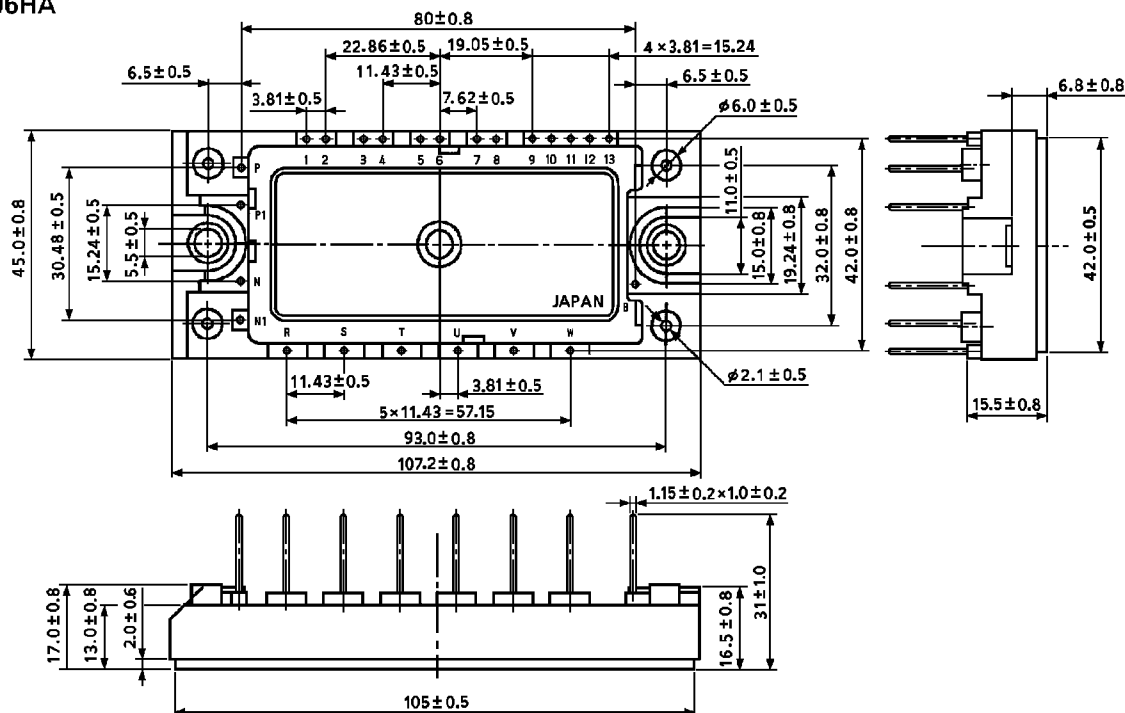
MIG20J906H



2-108E5A

Unit : mm

MIG20J906HA



2-108E6A

MAXIMUM RATINGS (Ta = 25°C)

STAGE		CHARACTERISTIC		SYMBOL	RATING	UNIT		
Inverter		Collector-Emitter Voltage		V _{CES}	600	V	(25°C / 40°C) (25°C / 40°C)	
		Gate-Emitter Voltage		V _{GES}	± 20	V		
		Collector Current	DC	I _C	25 / 20	A		
			1ms	I _{CP}	50 / 40	A		
		Forward Current	DC	I _F	20	A		
			1ms	I _{FM}	40	A		
Collector Power Dissipation (T _c =25°C)		P _C	90	W				
Converter		Repetitive Peak Reverse Voltage		V _{RRM}	800	V	(25°C / 40°C) (25°C / 40°C)	
		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) (25°C / 40°C)
		Gate-Emitter Voltage		V _{GES}	± 20	V		
		Collector Current	DC	I _C	25 / 20	A		
			1ms	I _{CP}	50 / 40	A		
	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		
			1ms	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		

(25°C / 40°C)

(25°C / 40°C)

(25°C / 40°C)

(25°C / 40°C)

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

a. Inverter 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
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		$V_{CE}(\text{sat})$	$I_C = 20\text{A}$ $V_{GE} = 15\text{V}$	—	2.1	2.7	V
			$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	—	2.2	2.8	
Input Capacitance		C_{ies}	$V_{CE} = 10\text{V}$, $V_{GE} = 0$, $f = 1\text{MHz}$	—	1850	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 300\text{V}$ $I_C = 20\text{A}$ $V_{GE} = \pm 15\text{V}$ $R_G = 62\Omega$ (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	$I_F = 20\text{A}$, $V_{GE} = 0$	—	2.0	2.8	V
Reverse Recovery Time		t_{rr}	$I_F = 20\text{A}$, $V_{GE} = -10\text{V}$, $di/dt = 100\text{A}/\mu\text{s}$	—	0.08	0.15	μs
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	1.39	$^\circ\text{C}/\text{W}$
			Diode	—	—	2.6	

b. Converter stage

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Repetitive Peak Reverse Current	I_{RRM}	$V_{RRM} = 800\text{V}$	—	—	50	μA
Peak Forward Voltage	V_{FM}	$I_{FM} = 30\text{A}$	—	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	$^\circ\text{C}/\text{W}$

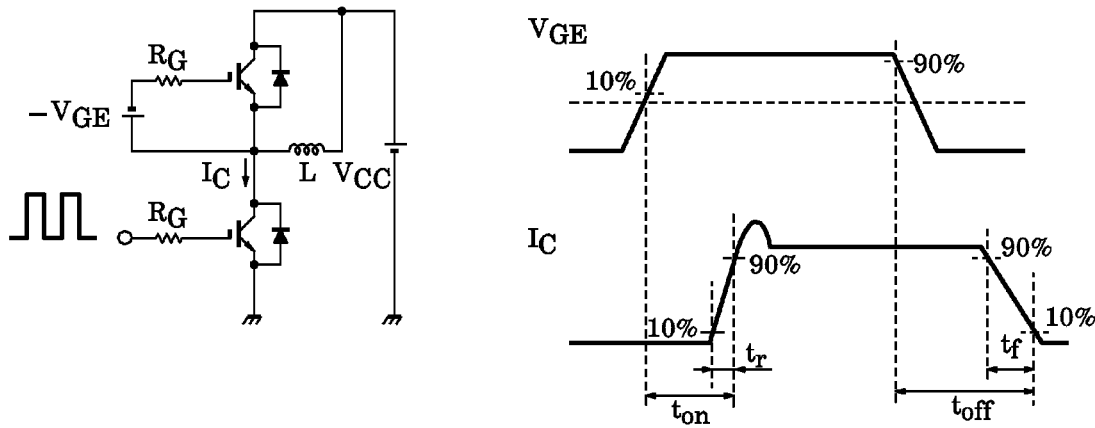
c. Brake stage

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		$V_{GE (off)}$	$I_C = 2mA, V_{CE} = 5V$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE (sat)}$	$I_C = 20A$ $V_{GE} = 15V$	—	2.1	2.7	V
			$T_j = 25^{\circ}C$ $T_j = 125^{\circ}C$	—	2.2	2.8	
Input Capacitance		C_{ies}	$V_{CE} = 10V, V_{GE} = 0, f = 1MHz$	—	1850	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 600V$ $I_C = 20A$ $V_{GE} = \pm 15V$ $R_G = 62\Omega$ (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	$I_F = 20A, V_{GE} = 0$	—	2.0	2.8	V
Thermal Resistance		$R_{th (j-c)}$	Transistor	—	—	1.39	$^{\circ}C / W$
			Diode	—	—	2.6	

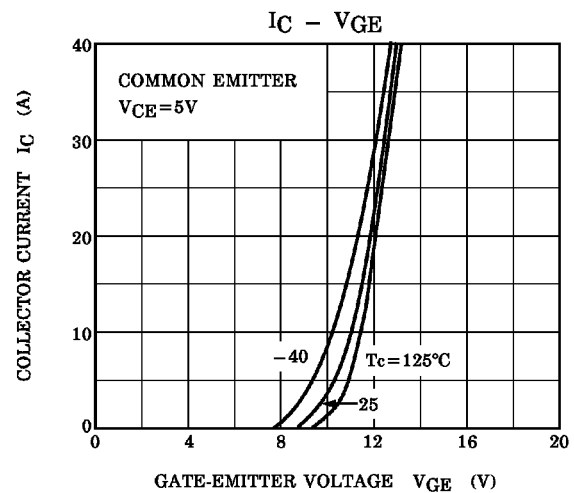
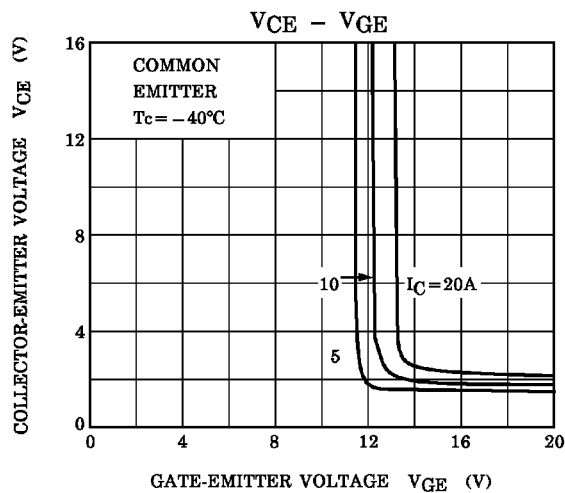
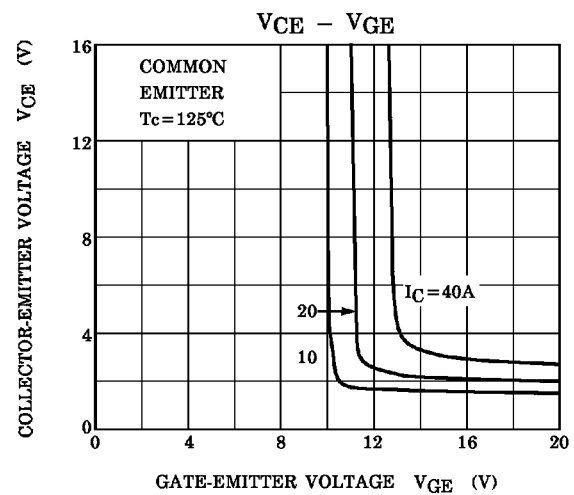
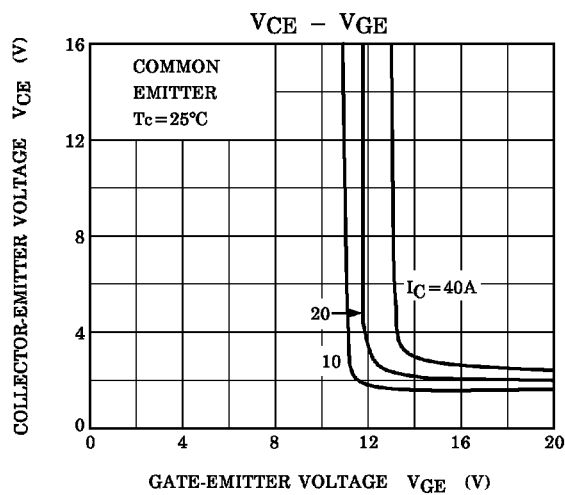
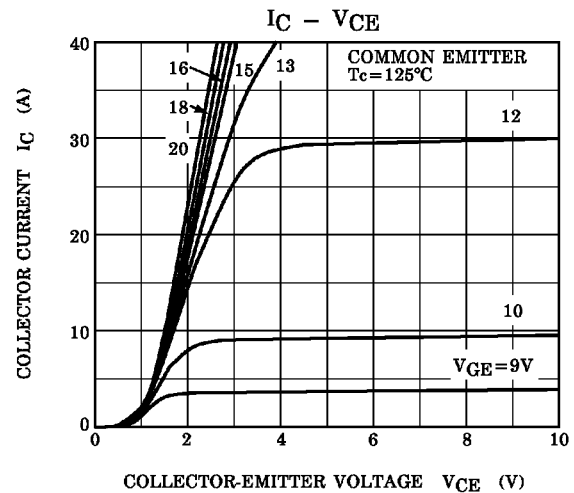
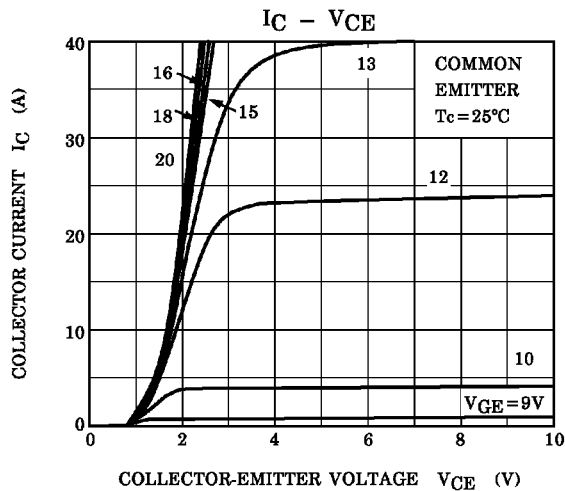
d. Thermistor

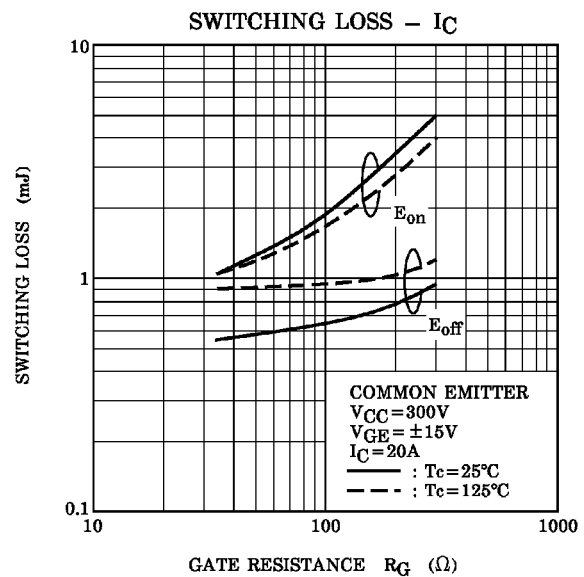
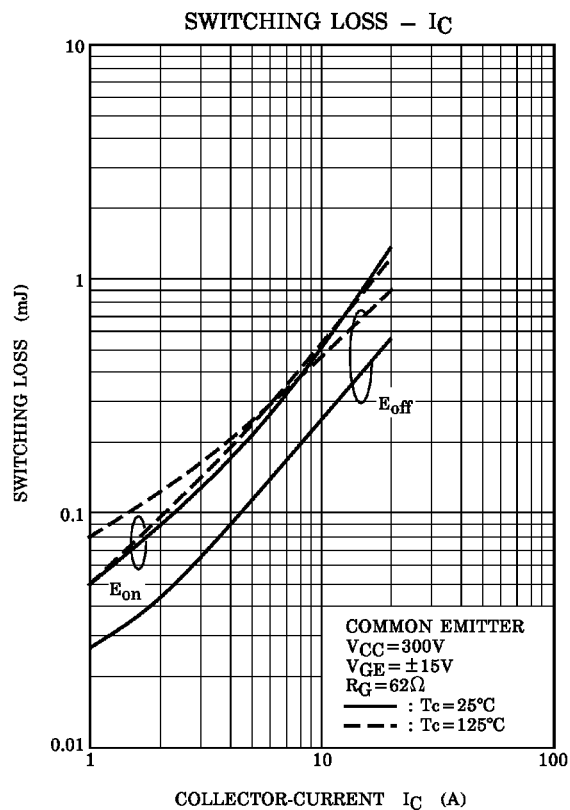
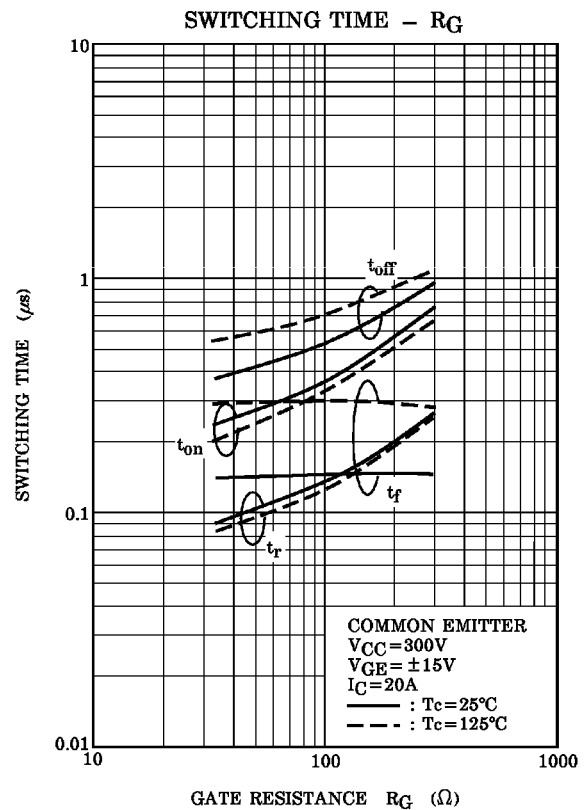
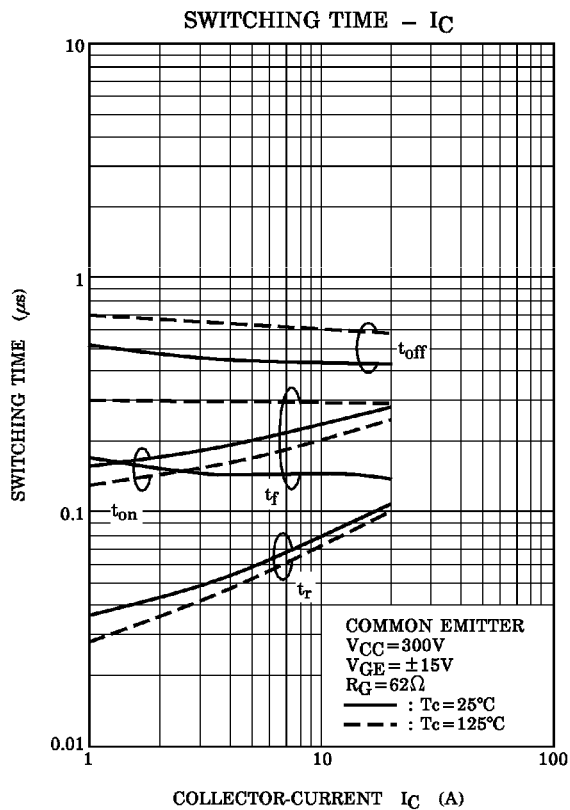
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Zero-power Resistance	R_{25}	$I_{TM} = 0.2mA, T_c = 25^{\circ}C$	17.31	20	23.14	$k\Omega$
B Value	$B_{25 / 85}$	$T_c = 25^{\circ}C / T_c = 85^{\circ}C$	—	3760	—	K

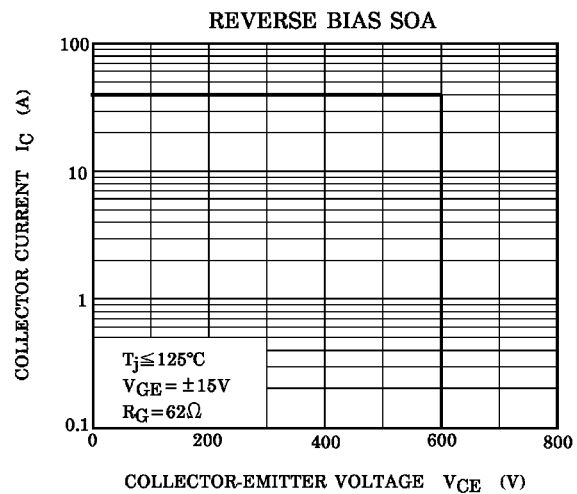
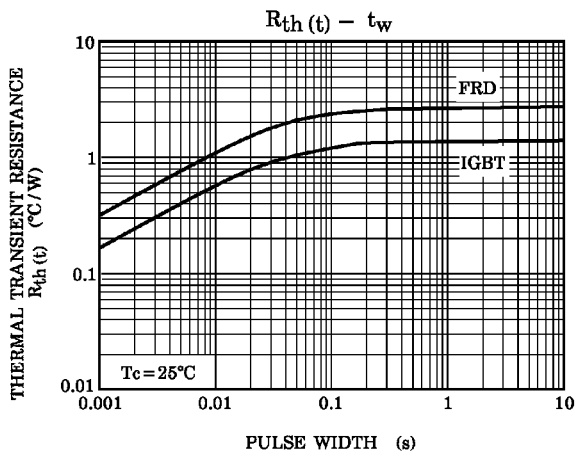
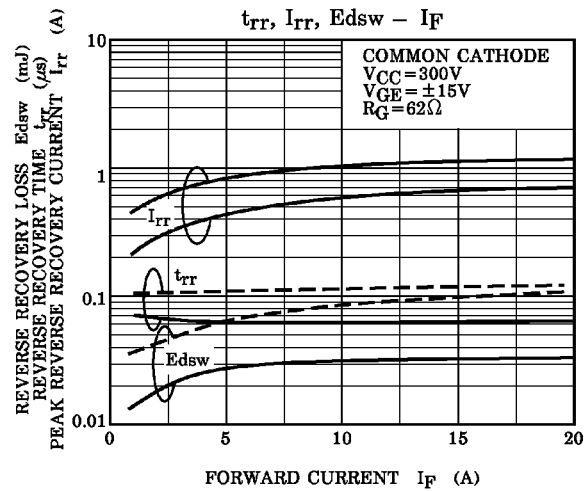
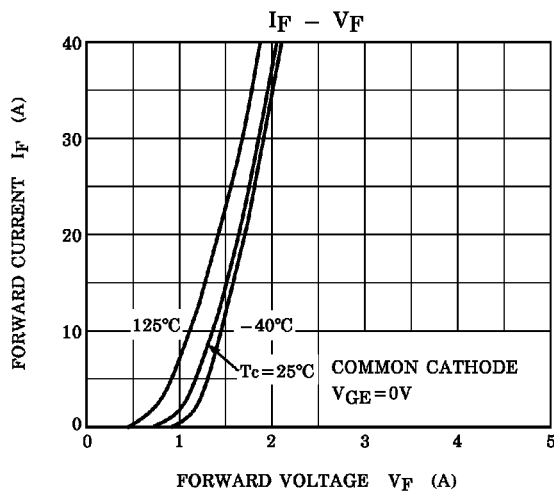
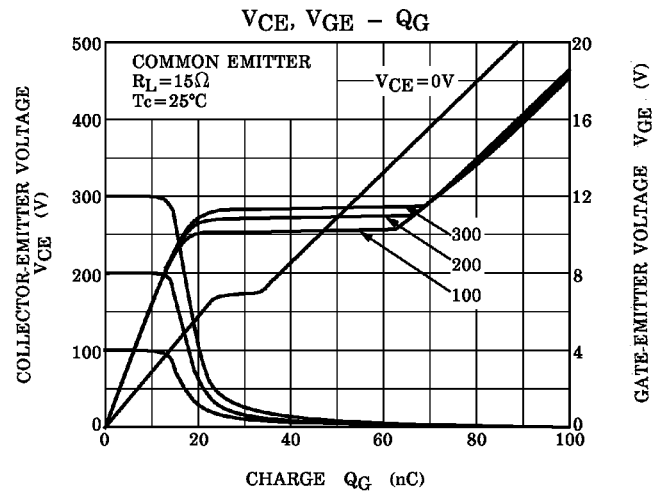
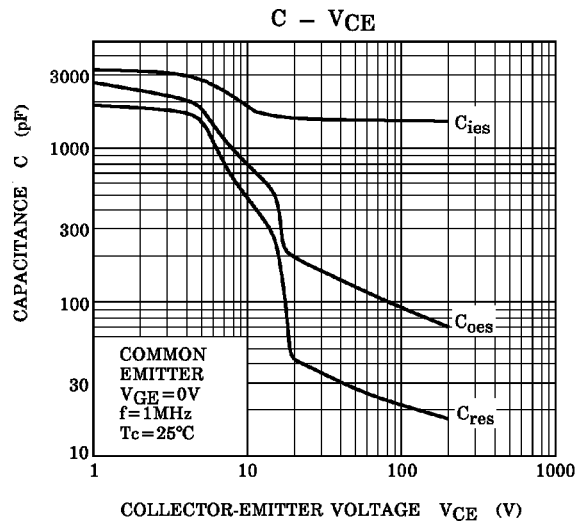
(Note 1) Switching Time Test Circuit & Timing Chart



a. Inverter stage/c. Brake stage







b. Converter stage

