

TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

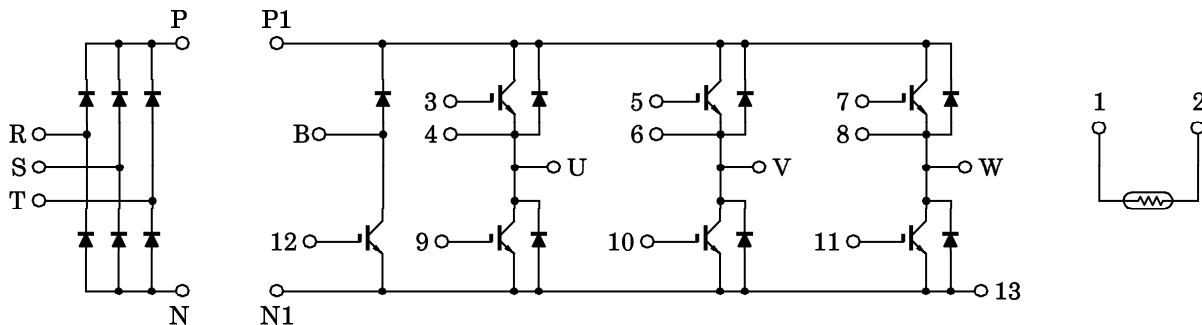
MIG50J906H

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter and Brake Power Circuits and Thermistor in One Package.
- Output (Inverter Stage) : 3ϕ 50 A / 600 V IGBT
- Input (Converter Stage) : 3ϕ 30 A / 800 V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Outline
MIG50J906H : 2-108E5A
- Weight : 190 g

EQUIVALENT CIRCUIT

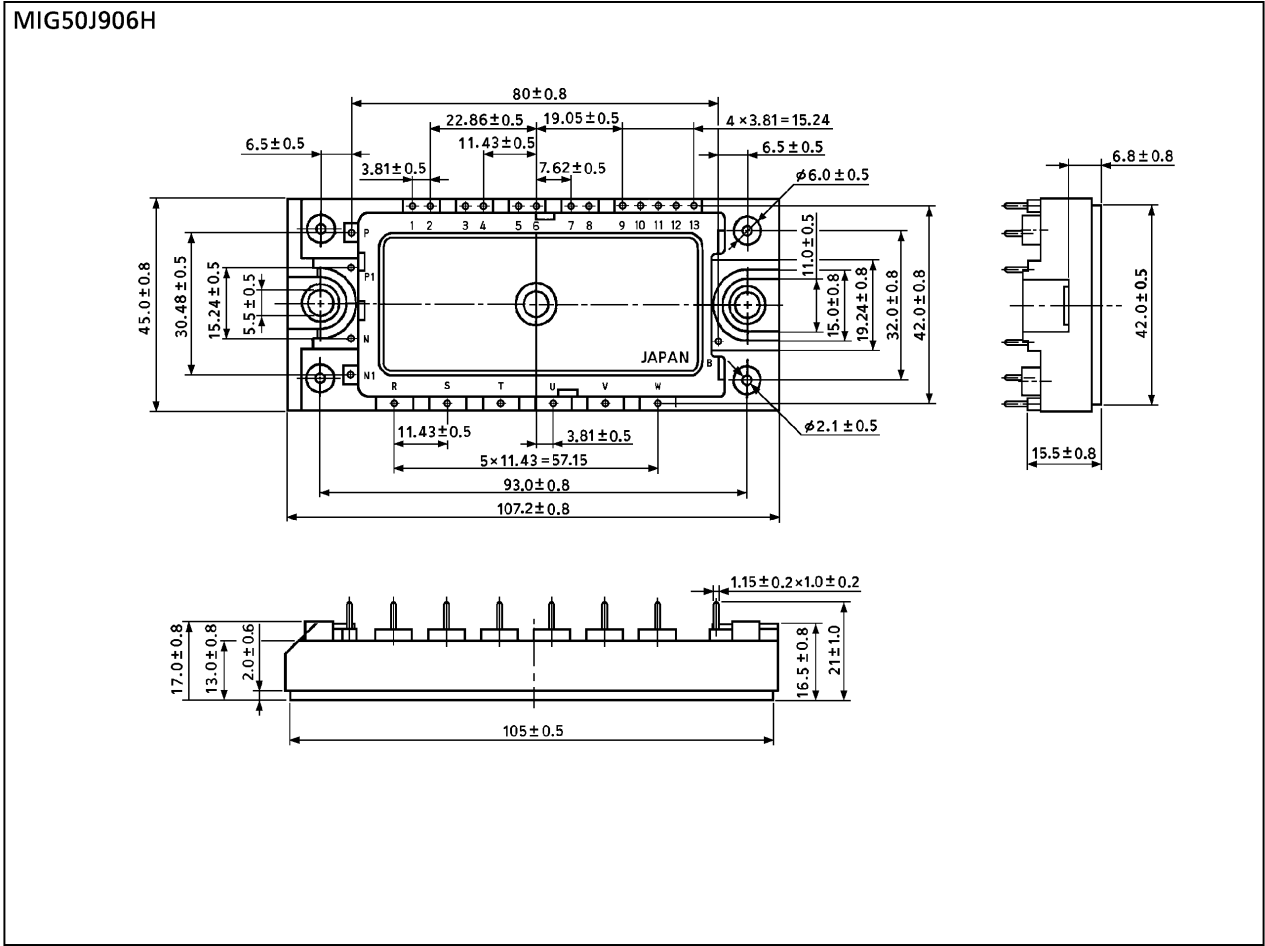


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PACKAGE DIMENSION

Unit : mm



2-108E5A

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	75 / 50	A	(25°C / 40°C)	
		1 ms		I _{CP}	150 / 100	A	(25°C / 40°C)	
	Forward Current	DC		I _F	50	A		
		1 ms		I _{FM}	100	A		
Collector Power Dissipation (T _c = 25°C)			P _C	200	W			
Converter	Repetitive Peak Reverse Voltage			V _R	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	
		Gate-Emitter Voltage			V _{GES}	±20	V	
		Collector Current	DC		I _C	75 / 50	A	(25°C / 40°C)
			1 ms		I _{CP}	150 / 100	A	(25°C / 40°C)
	Collector Power Dissipation (T _c = 25°C)			P _C	200	W		
	FWD	Reverse Voltage			V _R	600	V	
		Forward Current	DC		I _F	50	A	
			1 ms		I _{FM}	100	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}	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector Cut-Off Current		I_{CES}	$V_{CE} = 600 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		$V_{GE}(\text{off})$	$I_C = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE}(\text{sat})$	$I_C = 50 \text{ A}$	—	2.1	2.7	V
			$V_{GE} = 15 \text{ V}$	—	2.2	2.8	
Input Capacitance		C_{ies}	$V_{CE} = 10 \text{ V}, V_{GE} = 0,$ $f = 1 \text{ MHz}$	—	4800	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 300 \text{ V}$	—	0.13	0.20	μs
	Turn-On Time	t_{on}	$I_C = 50 \text{ A}$	—	0.30	0.50	
	Fall Time	t_f	$V_{GE} = \pm 15 \text{ V}$	—	0.15	0.30	
	Turn-Off Time	t_{off}	$R_G = 24 \Omega$ (Note 1)	—	0.50	0.80	
Forward Voltage		V_F	$I_F = 50 \text{ A}, V_{GE} = 0$	—	2.3	3.0	V
Reverse Recovery Time		t_{rr}	$I_F = 50 \text{ A}, V_{GE} = -10 \text{ V}$ $di/dt = 100 \text{ A}/\mu\text{s}$	—	0.08	0.15	μs
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	0.6	$^{\circ}\text{C}/\text{W}$
			Diode	—	—	1.5	

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}	50 Hz sine-half-wave	400	—	—	A
Thermal Resistance		$R_{th(j-c)}$	—	—	—	1.56	$^{\circ}\text{C}/\text{W}$

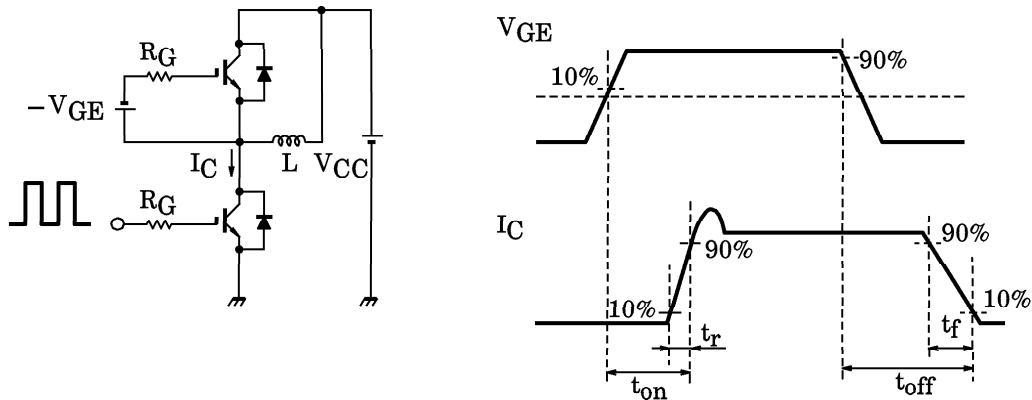
c. Brake stage

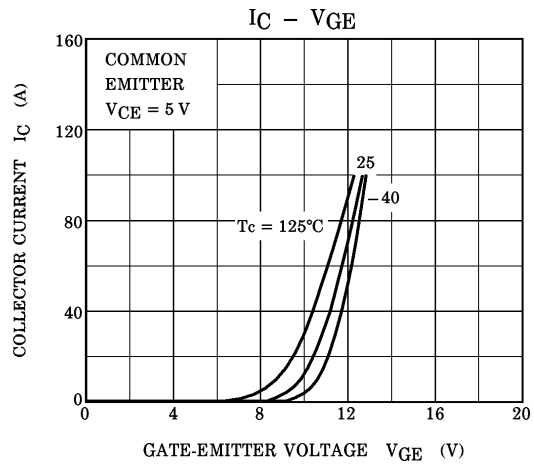
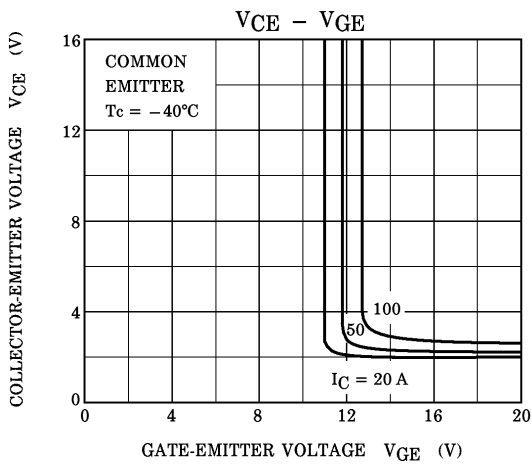
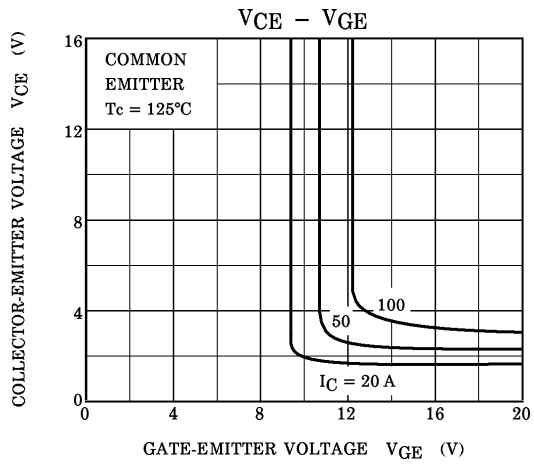
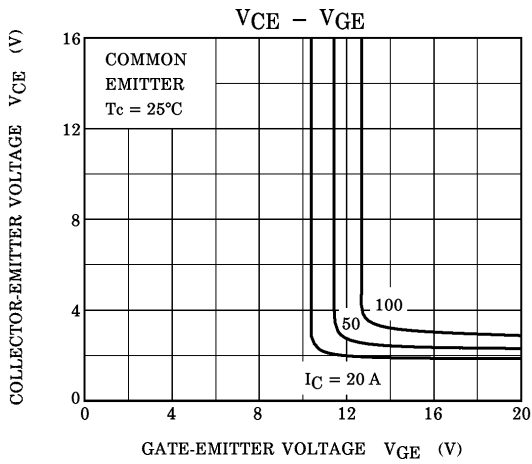
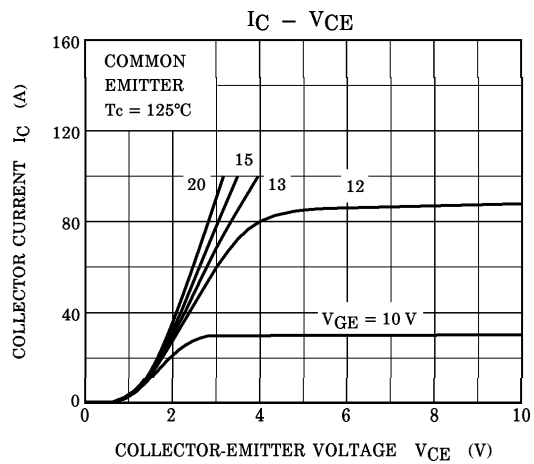
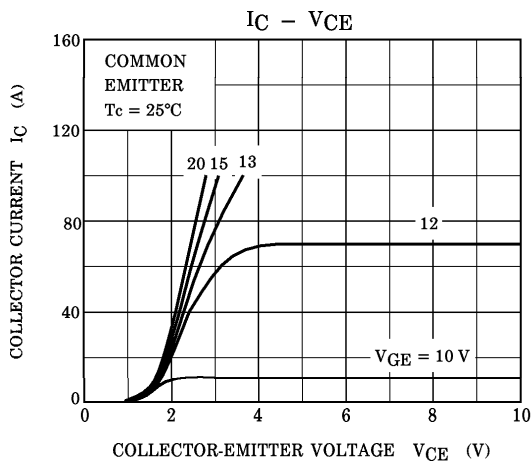
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GES}	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector Cut-Off Current		I_{CES}	$V_{CE} = 600\text{ V}, V_{GE} = 0$	—	—	1.0	mA
Reverse Current		I_R	$V_R = 600\text{ V}$	—	—	1.0	mA
Gate-Emitter Cut-Off Voltage		$V_{GE}(\text{off})$	$I_C = 5\text{ mA}, V_{CE} = 5\text{ V}$	5.0	—	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE}(\text{sat})$	$I_C = 50\text{ A}$	—	2.1	2.7	V
			$V_{GE} = 15\text{ V}$	—	2.2	2.8	
Input Capacitance		C_{ies}	$V_{CE} = 10\text{ V}, V_{GE} = 0,$ $f = 1\text{ MHz}$	—	4800	—	pF
Switching Time	Rise Time	t_r	$V_{CC} = 600\text{ V}$	—	0.13	0.20	μs
	Turn-On Time	t_{on}	$I_C = 50\text{ A}$	—	0.30	0.50	
	Fall Time	t_f	$V_{GE} = \pm 15\text{ V}$	—	0.15	0.30	
	Turn-Off Time	t_{off}	$R_G = 24\ \Omega$ (Note 1)	—	0.50	0.80	
Forward Voltage		V_F	$I_F = 50\text{ A}, V_{GE} = 0$	—	2.3	3.0	V
Thermal Resistance		$R_{th(j-c)}$	Transistor	—	—	0.6	$^{\circ}\text{C/W}$
			Diode	—	—	1.5	

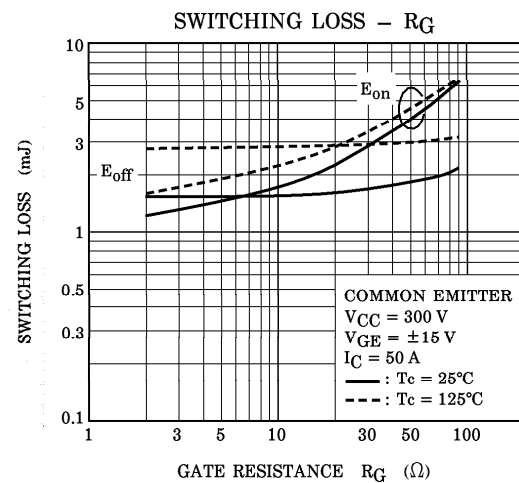
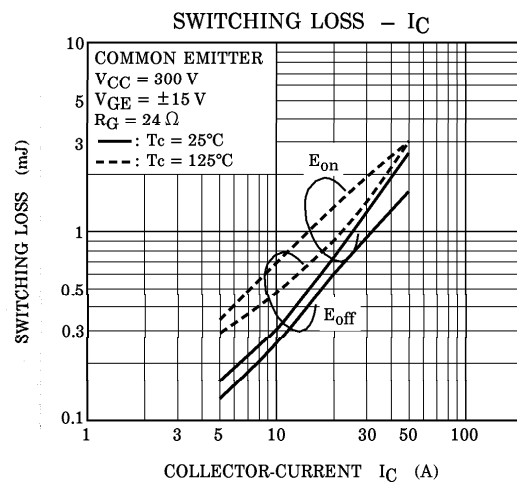
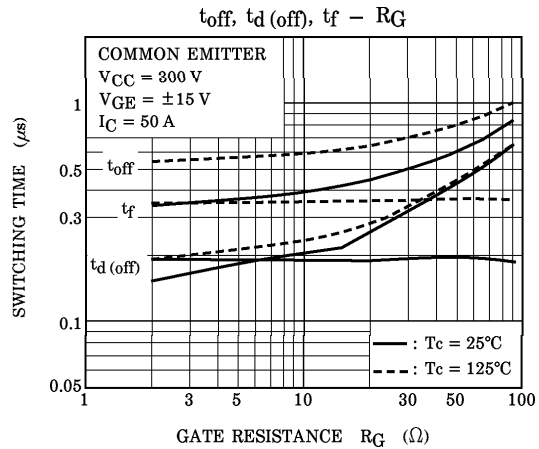
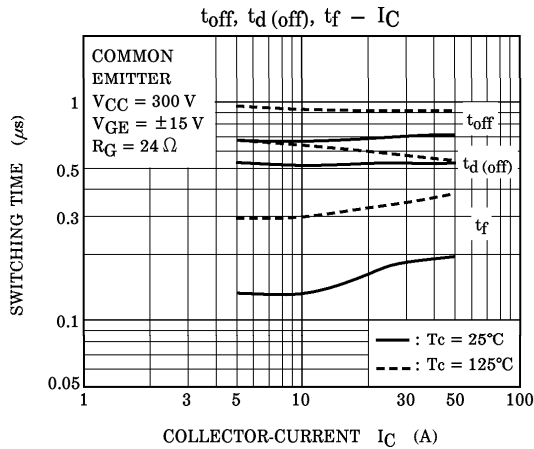
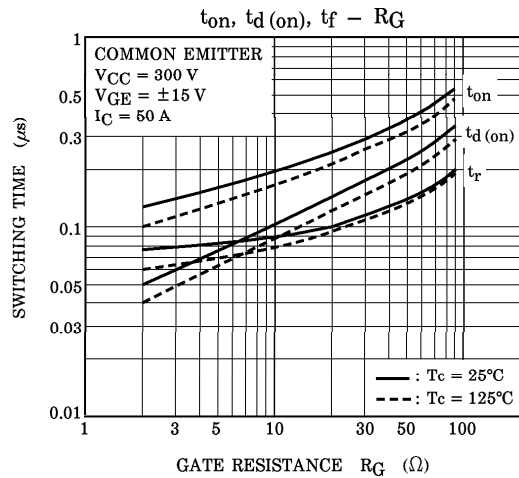
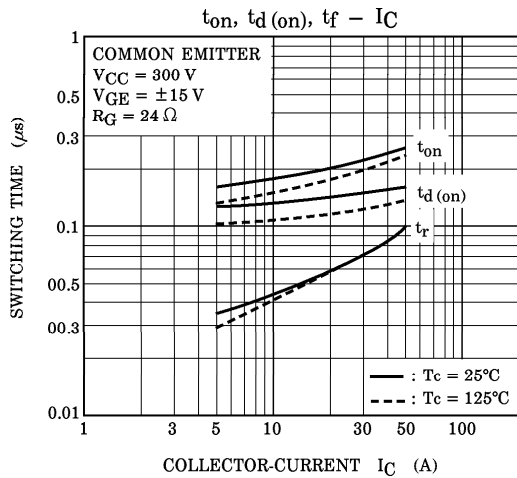
d. Thermistor

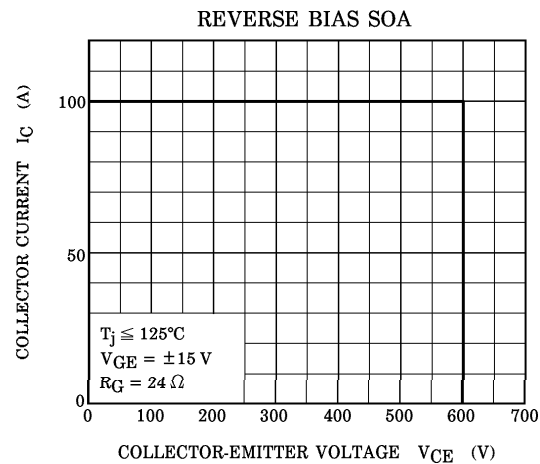
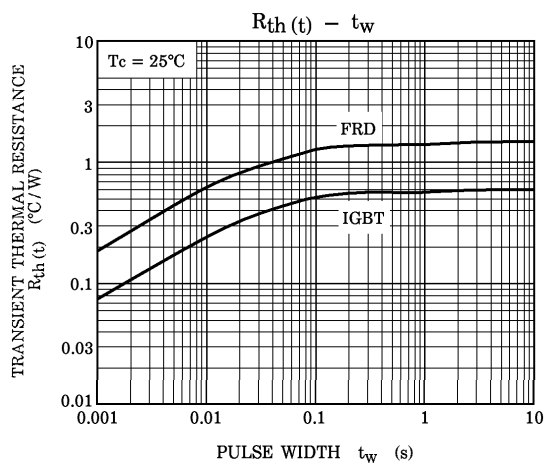
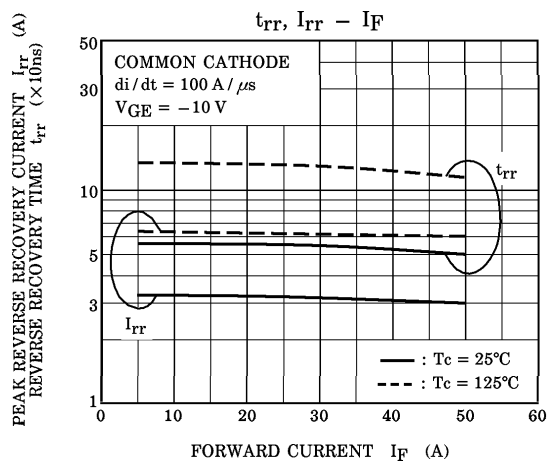
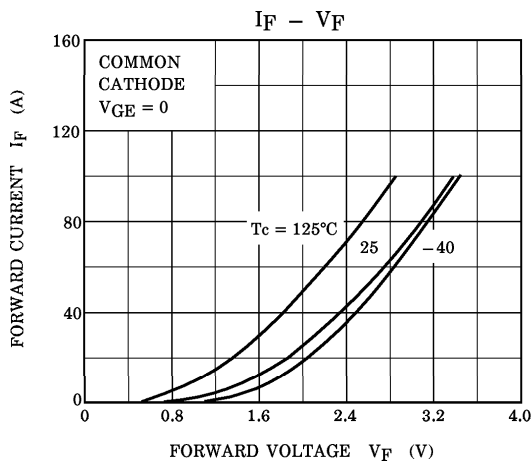
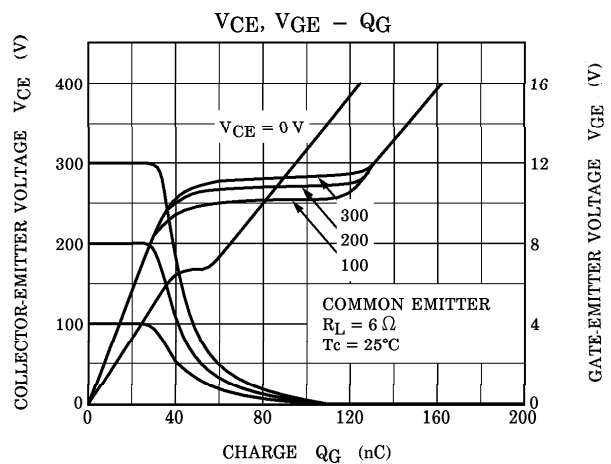
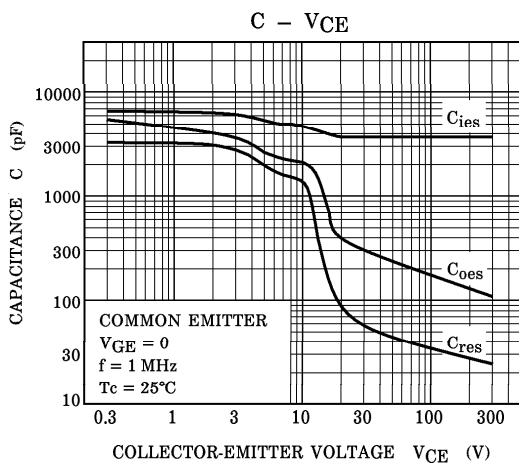
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Zero-power Resistance	R_{25}	$I_{TM} = 0.2\text{ mA}, T_c = 25^{\circ}\text{C}$	17.31	20	23.14	$\text{k}\Omega$
B Value	$B_{25/85}$	$T_c = 25^{\circ}\text{C} / T_c = 85^{\circ}\text{C}$	—	3760	—	K

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









b. Converter stage

