

### 600V / 20A 6 in one-package

#### ■ Features

- Compact Single in -line package

#### ■ Applications

- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply
- Industrial machines, such as Welding machines

#### ■ Maximum ratings and characteristics

##### ● Absolute maximum ratings (at Tc=25°C unless otherwise specified)

Item	Symbol	Rating	Unit
Collector-Emitter voltage	V <sub>CES</sub>	600	V
Gate-Emitter voltage	V <sub>GES</sub>	±20	V
Collector current	Continuous	I <sub>C</sub>	20
	1ms	I <sub>C</sub> pulse	40
		-I <sub>C</sub>	20
	1ms	-I <sub>C</sub> pulse	40
Max. power dissipation	P <sub>C</sub>	70	W
Operating temperature	T <sub>j</sub>	+150	°C
Storage temperature	T <sub>stg</sub>	-40 to +125	°C
Isolation voltage	V <sub>is</sub>	AC 2000 (1min.)	V
Screw torque	Mounting *1	1.7	N·m

\*1 : Recommendable value : 1.3 to 1.7 N·m (M4)

##### ● Electrical characteristics (at Tj=25°C unless otherwise specified)

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	I <sub>CES</sub>	–	–	1.0	V <sub>GE</sub> =0V, V <sub>CES</sub> =600V	mA
Gate-Emitter leakage current	I <sub>GES</sub>	–	–	0.1	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	µA
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	5.5	–	8.5	V <sub>CE</sub> =20V, I <sub>C</sub> =20mA	V
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub>	–	–	2.8	V <sub>GE</sub> =15V, I <sub>C</sub> =20A	V
Input capacitance	C <sub>ies</sub>	–	1300	–	V <sub>GE</sub> =0V	pF
Output capacitance	C <sub>oes</sub>	–	300	–	V <sub>CE</sub> =10V	
Reverse transfer capacitance	C <sub>res</sub>	–	72	–	f=1MHz	
Turn-on time	t <sub>on</sub>	–	–	1.2	V <sub>CC</sub> =300V	µs
	t <sub>r</sub>	–	–	1.0	I <sub>C</sub> =20A	
Turn-off time	t <sub>off</sub>	–	–	1.0	V <sub>GE</sub> =±15V	
	t <sub>f</sub>	–	–	0.35	R <sub>G</sub> =120ohm	
Diode forward on voltage	V <sub>F</sub>	–	–	3.0	I <sub>F</sub> =20A, V <sub>GE</sub> =0V	V
Reverse recovery time	t <sub>rr</sub>	–	–	0.3	I <sub>F</sub> =20A, -di/dt=60A/µs, V <sub>GE</sub> =-10V	µs

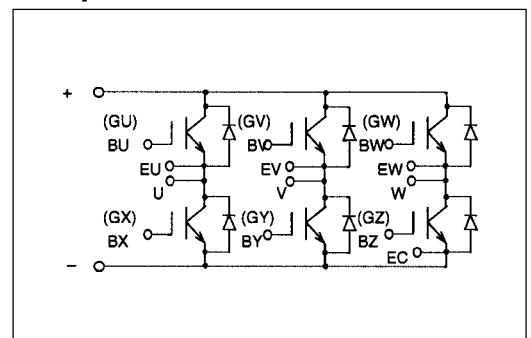
##### ● Thermal resistance characteristics

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	R <sub>th(j-c)</sub>	–	–	1.79	IGBT	°C/W
	R <sub>th(j-c)</sub>	–	–	2.5	Diode	°C/W
	R <sub>th(c-f)*2</sub>	–	0.06	–	the base to cooling fin	°C/W

\*2 : This is the value which is defined mounting on the additional cooling fin with thermal compound

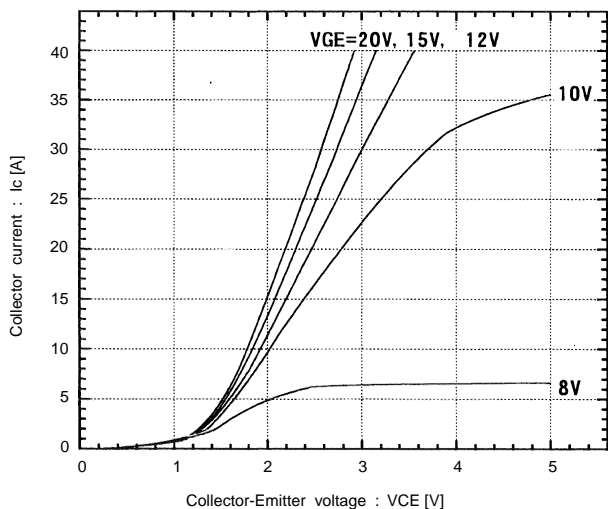


#### ■ Equivalent Circuit Schematic

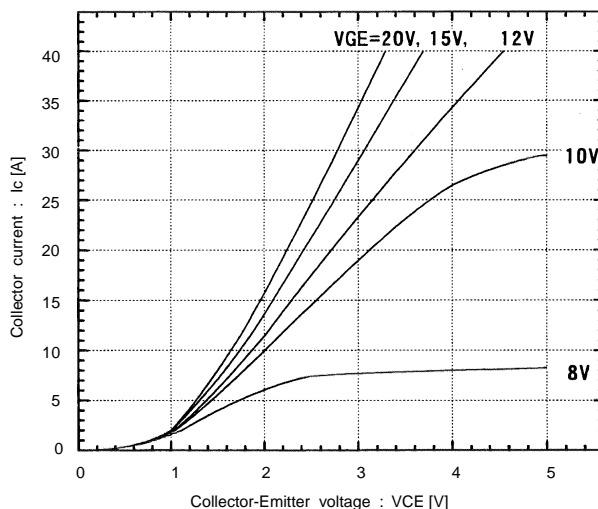


Characteristics (Representative)

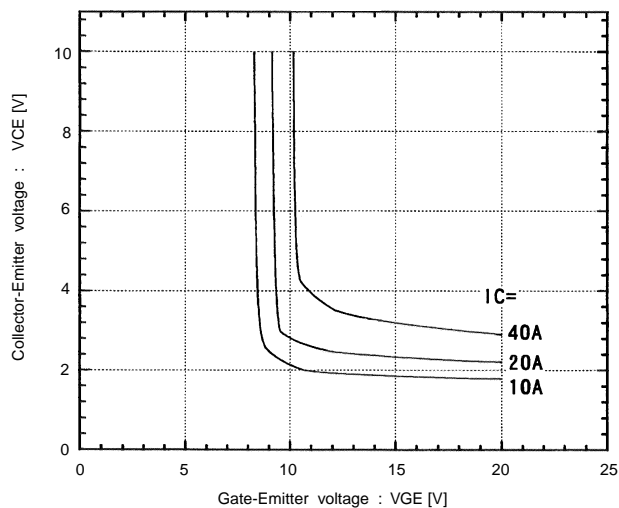
Collector current vs. Collector-Emitter voltage  
T<sub>j</sub>=25°C



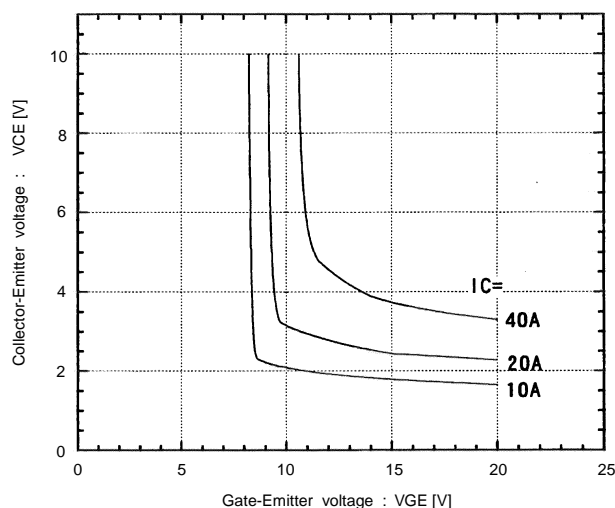
Collector current vs. Collector-Emitter voltage  
T<sub>j</sub>=125°C



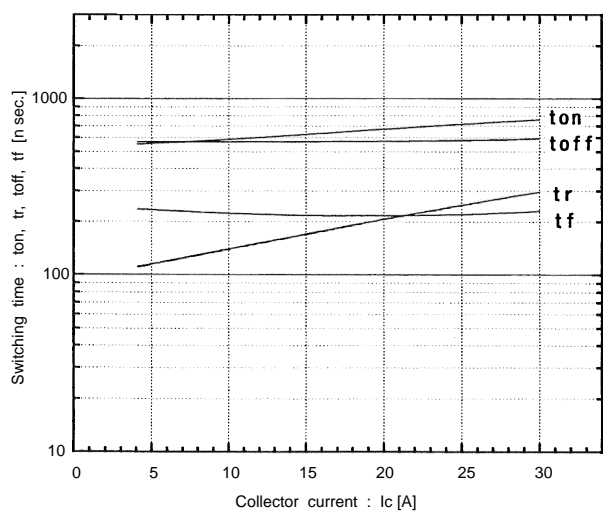
Collector-Emitter vs. Gate-Emitter voltage  
T<sub>j</sub>=25°C



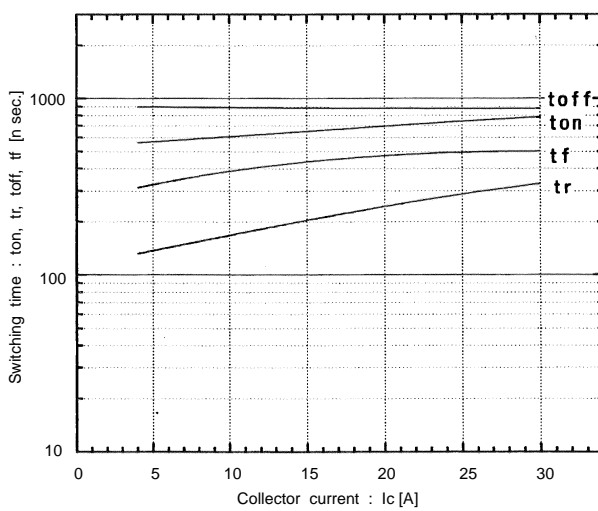
Collector-Emitter vs. Gate-Emitter voltage  
T<sub>j</sub>=125°C

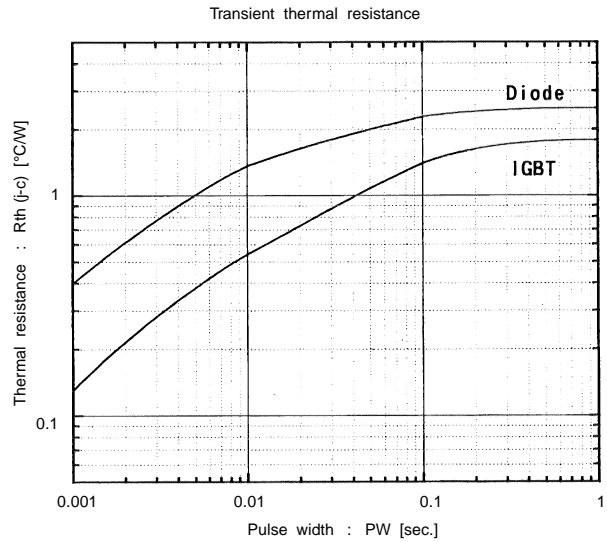
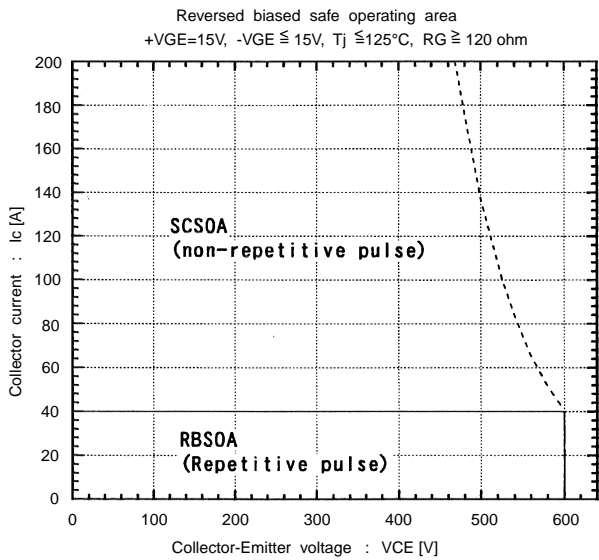
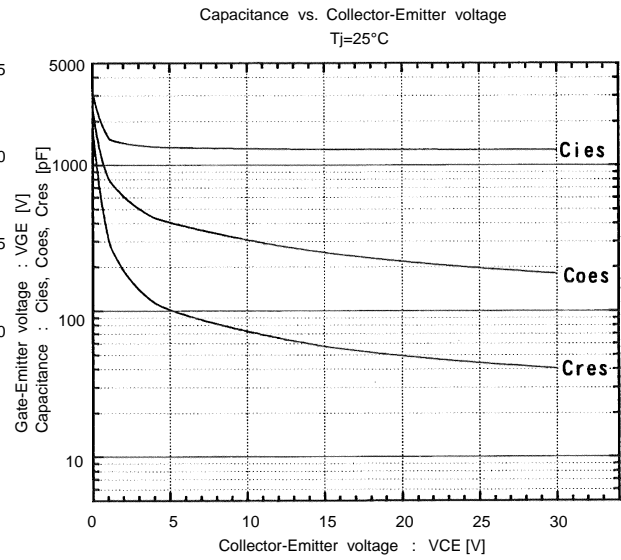
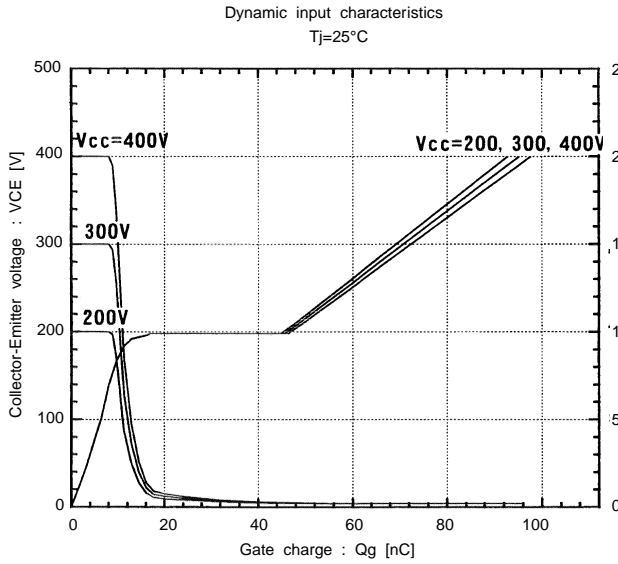
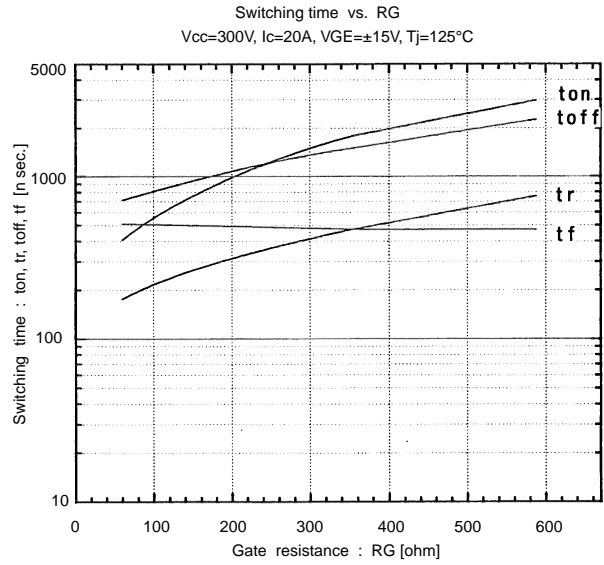
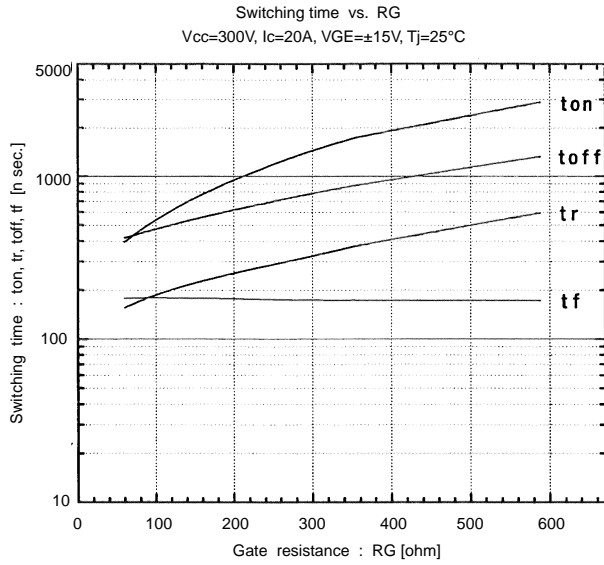


Switching time vs. Collector current  
V<sub>cc</sub>=300V, R<sub>G</sub>=120 ohm, V<sub>GE</sub>=±15V, T<sub>j</sub>=25°C

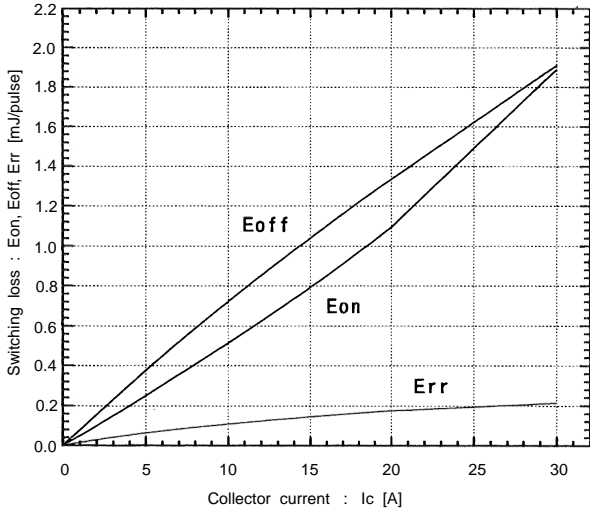


Switching time vs. Collector current  
V<sub>cc</sub>=300V, R<sub>G</sub>=120 ohm, V<sub>GE</sub>=±15V, T<sub>j</sub>=125°C

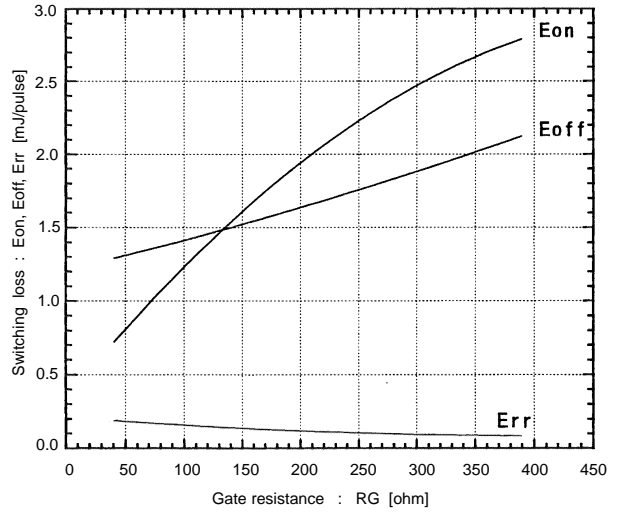




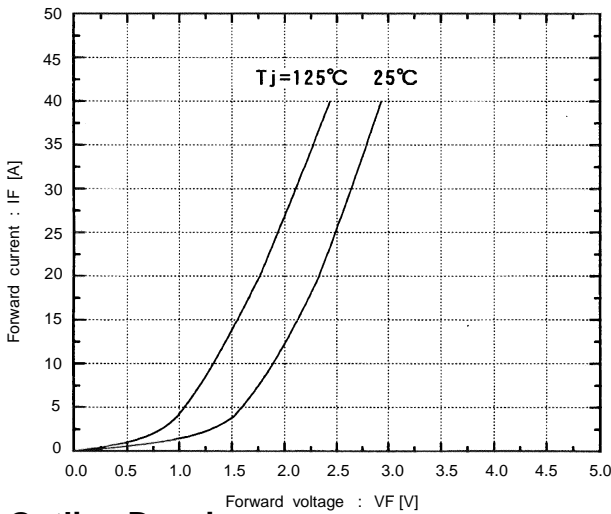
Switching loss vs. Collector current  
 $V_{cc}=300V, R_G=120\ \text{ohm}, V_{GE}=\pm 15V, T_J=125^\circ\text{C}$



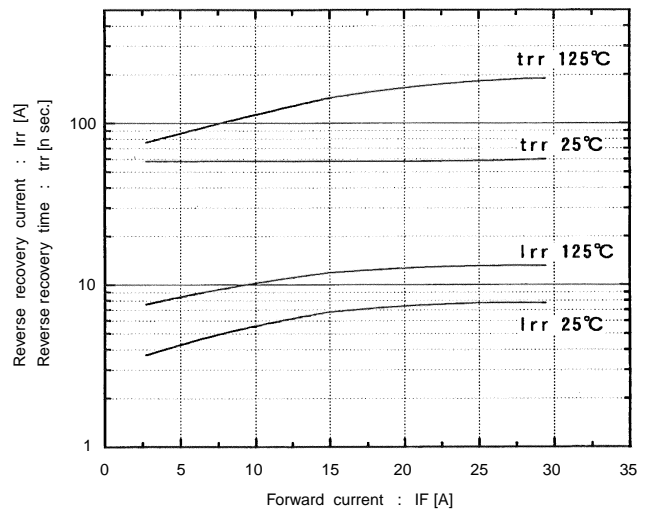
Switching loss vs. Gate resistance  
 $V_{cc}=300V, I_c=20A, V_{GE}=\pm 15V, T_J=125^\circ\text{C}$



Forward current vs. Forward voltage



Reverse recovery characteristics  
 $t_{rr}, I_{rr}$  vs.  $I_F$



Outline Drawings, mm

