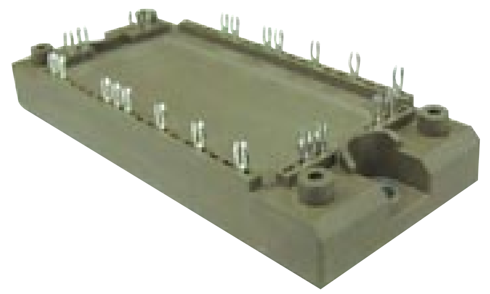
7MBR35VW120-50

IGBT MODULE (V series)

1200V / 35A / PIM

■ Features

Low V_{CE}(sat)
Compact Package
P.C.Board Mount Module
Converter Diode Bridge Dynamic Brake Circuit
RoHS compliant product



■ Applications

Inverter for Motor Drive
AC and DC Servo Drive Amplifier
Uninterruptible Power Supply

■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at Tc=25°C unless otherwise specified)

Items		Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	Ic	Continuous	Tc=80°C	35	A
		Icp	1ms	Tc=80°C	70	
		-Ic			35	
		-Ic pulse	1ms		70	
	Collector power dissipation	Pc	1 device		210	W
Brake	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	I_C	Continuous	Tc=80°C	25	A
		I_{CP}	1ms	Tc=80°C	50	
	Collector power dissipation	P_C	1 device		170	W
	Repetitive peak reverse voltage (Diode)	VRRM			1200	V
Converter	Repetitive peak reverse voltage	VRRM			1600	V
	Average output current	I_O	50Hz/60Hz, sine wave		35	A
	Surge current (Non-Repetitive)	I_{FSM}	10ms, Tj=150°C half sine wave		260	A
	I^2t (Non-Repetitive)	I^2t			338	A^2s
Junction temperature		Tj	Inverter, Brake		175	°C
			Converter		150	
Operating junciton temperature (under switching conditions)		Tjop	Inverter, Brake		150	
			Converter		150	
Case temperature		Tc			125	
Storage temperature		Tstg			-40 to +125	
Isolation voltage	between terminal and copper base (*1) between thermistor and others (*2)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*3)	-	M5		3.5	N m

Note *1: All terminals should be connected together during the test.
Note *2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.
Note *3: Recommendable value : 2.5-3.5 Nm (M5)

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

Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1200V		-	-	1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{GE} = 0V, V_{GE} = ±20V		-	-	200	nA
	Gate-Emitter threshold voltage	$V_{GE\ (th)}$	V_{CE} = 20V, I_C = 35mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (terminal)	V_{GE} = 15V I_C = 35A	Tj=25°C	-	2.15	2.60	V
				Tj=125°C	-	2.50	-	
				Tj=150°C	-	2.55	-	
		$V_{CE\ (sat)}$ (chip)	V_{GE} = 15V I_C = 35A	Tj=25°C	-	1.85	2.30	
				Tj=125°C	-	2.20	-	
				Tj=150°C	-	2.25	-	
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	2.9	-	nF
	Turn-on time	ton	V_{CC} = 600V I_C = 35A V_{GE} = +15 / -15V R_G = 27Ω		-	0.39	1.20	μs
		tr			-	0.09	0.60	
		tr (i)			-	0.03	-	
	Turn-off time	toff			-	0.53	1.00	
		tf			-	0.06	0.30	
	Forward on voltage	V_F (terminal)	I_F = 35A	Tj=25°C	-	2.00	2.45	V
				Tj=125°C	-	2.15	-	
				Tj=150°C	-	2.10	-	
		V_F (chip)	I_F = 35A	Tj=25°C	-	1.70	2.15	
				Tj=125°C	-	1.85	-	
				Tj=150°C	-	1.80	-	
	Reverse recovery time	trr	I_F = 35A		-	-	0.1	μs
Brake	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V V_{CE} = 1200V		-	-	1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE} = 0V V_{GE} = +20 / -20V		-	-	200	nA
	Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (terminal)	V_{GE} = 15V I_C = 25A	Tj=25°C	-	2.05	2.50	V
				Tj=125°C	-	2.40	-	
				Tj=150°C	-	2.45	-	
		$V_{CE\ (sat)}$ (chip)	V_{GE} = 15V I_C = 25A	Tj=25°C	-	1.85	2.30	
				Tj=125°C	-	2.20	-	
				Tj=150°C	-	2.25	-	
	Turn-on time	ton	V_{CC} = 600V I_C = 25A V_{GE} = +15 / -15V R_G = 39Ω		-	0.39	1.20	μs
		tr			-	0.09	0.60	
	Turn-off time	toff			-	0.53	1.00	
		tf			-	0.06	0.30	
	Reverse current	IRRM	V_R = 1200V		-	-	1.00	mA
Converter	Forward on voltage	V_{FM} (chip)	I_F = 35A	terminal	-	1.65	2.10	V
				chip	-	1.35	-	
	Reverse current	IRRM	V_R = 1600V		-	-	1.0	mA
Thermistor	Resistance	R	T = 25°C		-	5000	-	Ω
			T = 100°C		465	495	520	
	B value	B	T = 25 / 50°C		3305	3375	3450	K

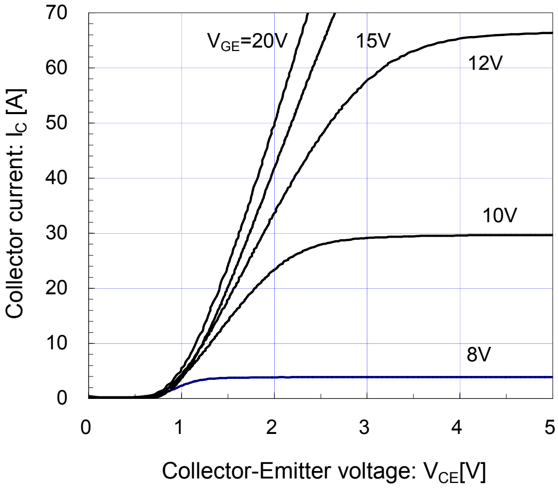
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.72	°C/W
		Inverter FWD	-	-	0.91	
		Brake IGBT	-	-	0.89	
		Converter Diode	-	-	0.88	
Contact thermal resistance (1device) (*4)	Rth(c-f)	with Thermal Compound	-	0.05	-	

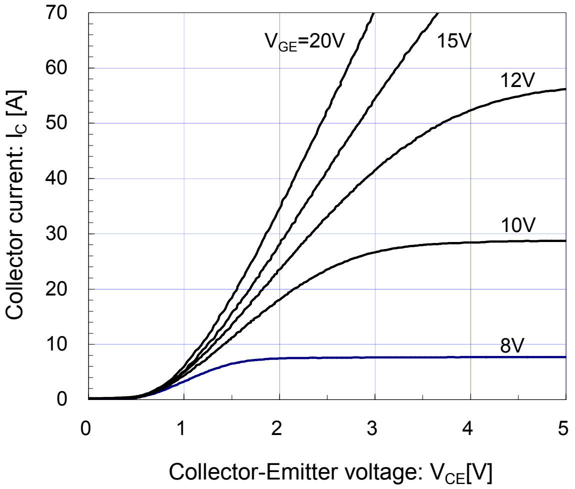
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

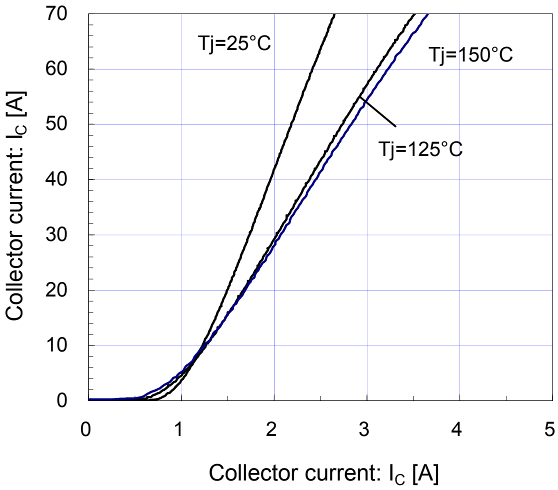
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25^{o}C / chip



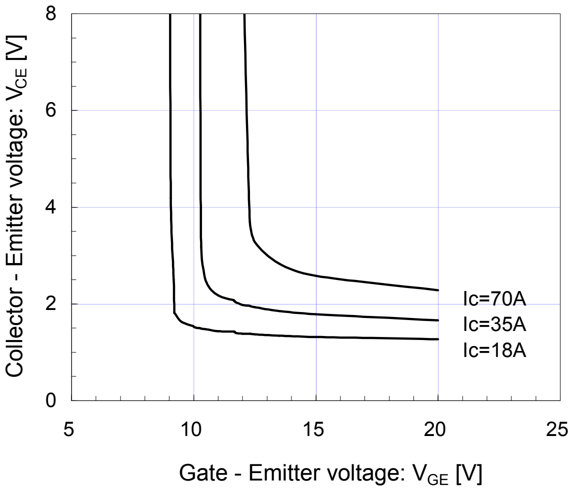
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150^{o}C / chip



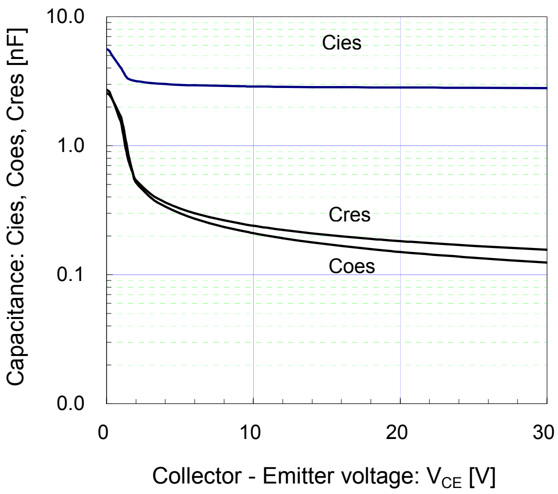
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



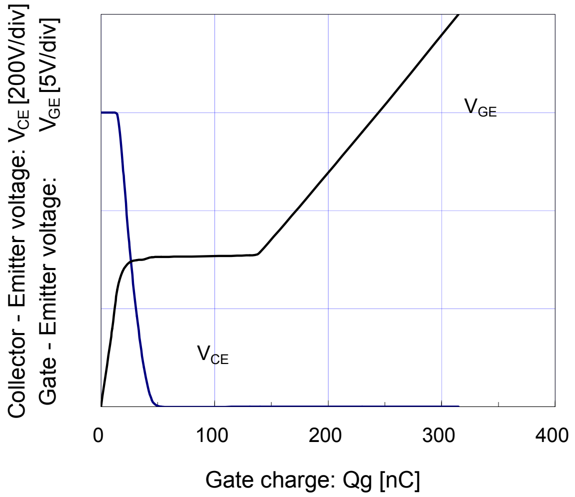
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25^{o}C / chip



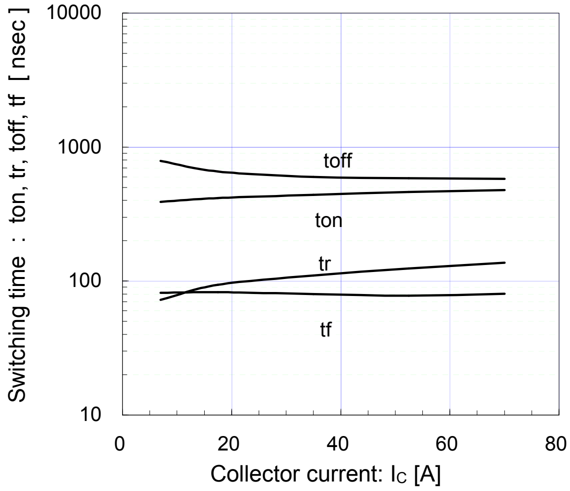
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f= 1MHz, Tj= 25^{o}C



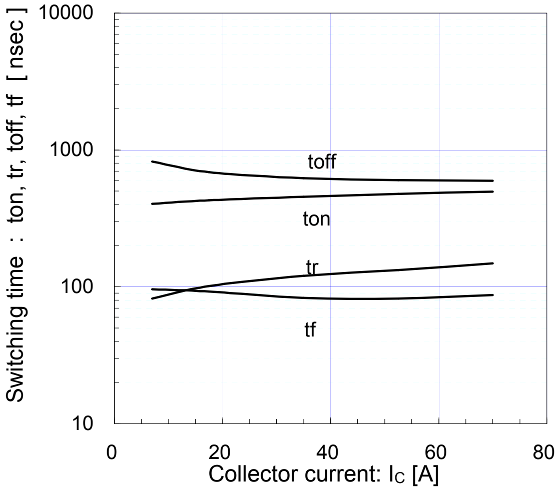
[Inverter]
Dynamic gate charge (typ.)
Vcc=600V, Ic=35A, Tj= 25°C



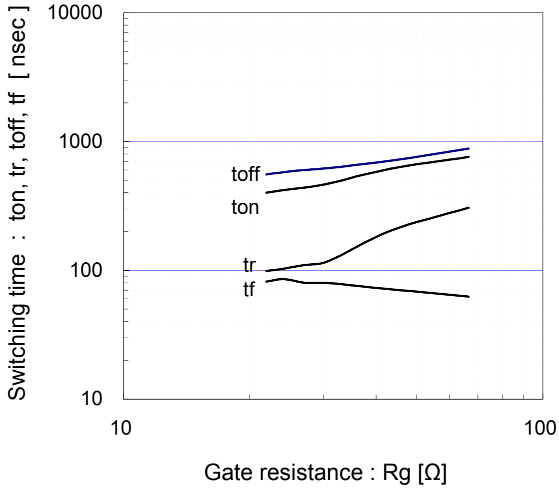
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=27Ω, Tj= 125°C



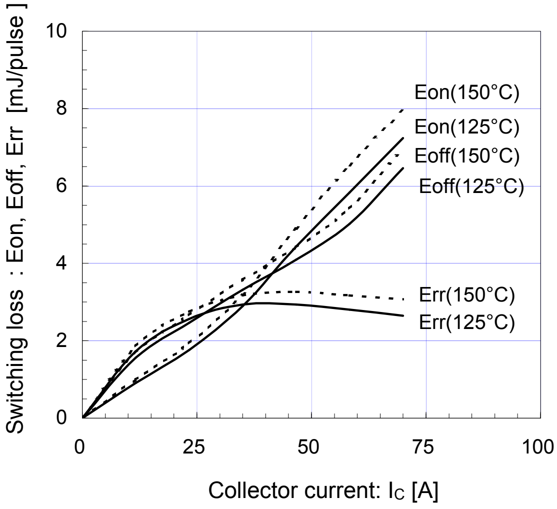
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=27Ω, Tj= 150°C



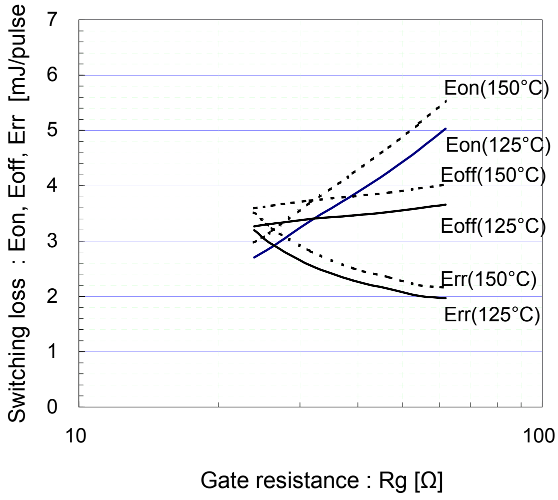
[Inverter]
Switching time vs. gate resistance (typ.)
Vcc=600V, Ic=35A, VGE=±15V, Tj= 125°C



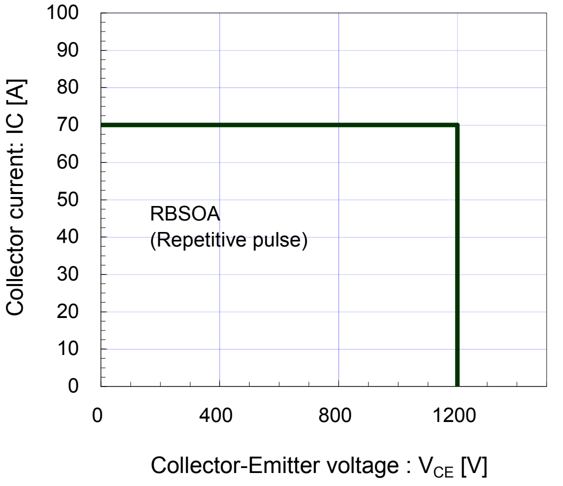
[Inverter] a
Switching loss vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=27Ω



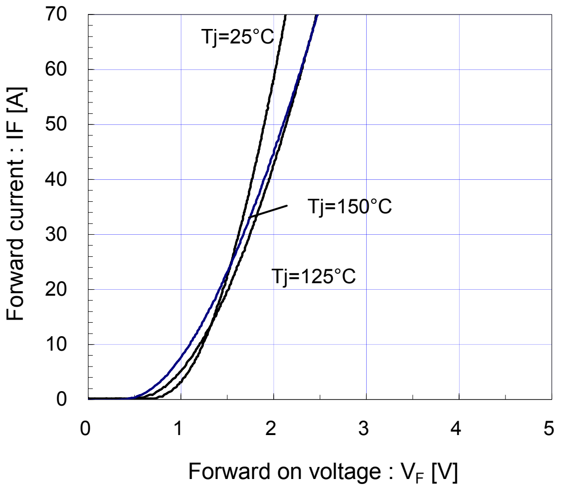
[Inverter]
Switching loss vs. gate resistance (typ.)
Vcc=600V, Ic=35A, VGE=±15V



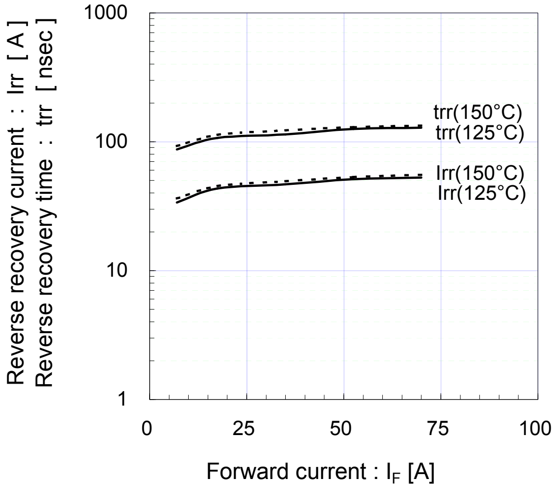
[Inverter]
Reverse bias safe operating area (max.)
+VGE=15V,-VGE <= 15V, RG >= 27Ω ,Tj <= 125°C



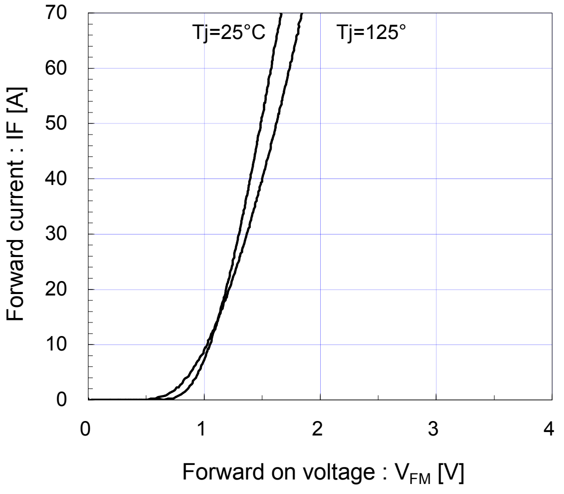
[Inverter]
Forward current vs. forward on voltage (typ.)
chip



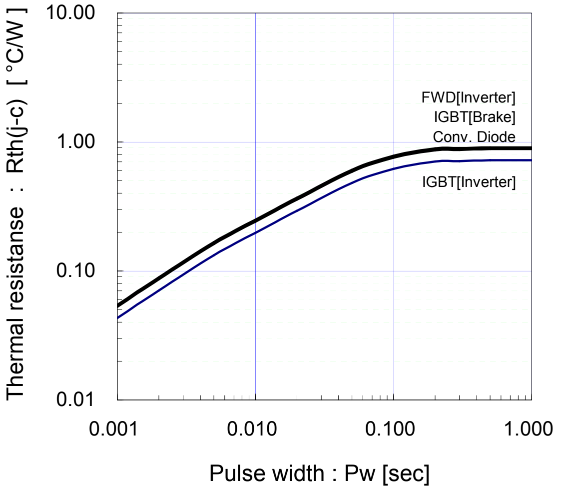
[Inverter]
Reverse recovery characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=27Ω



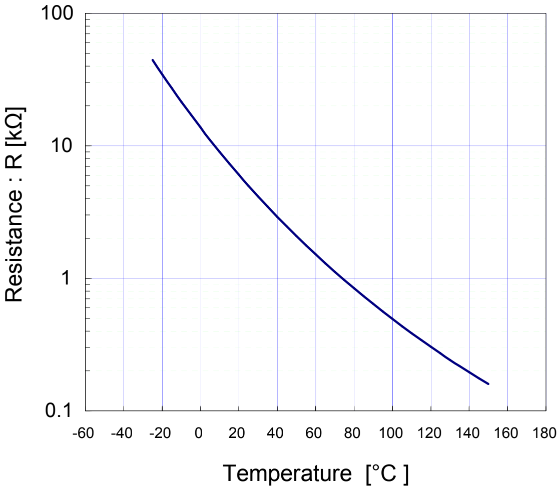
[Converter]
Forward current vs. forward on voltage (typ.)
chip



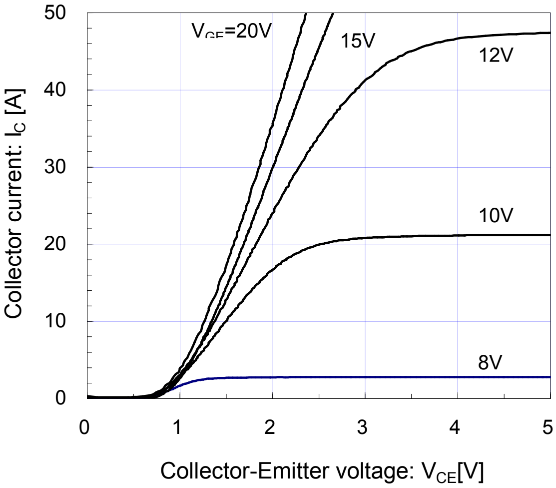
Transient thermal resistance (max.)



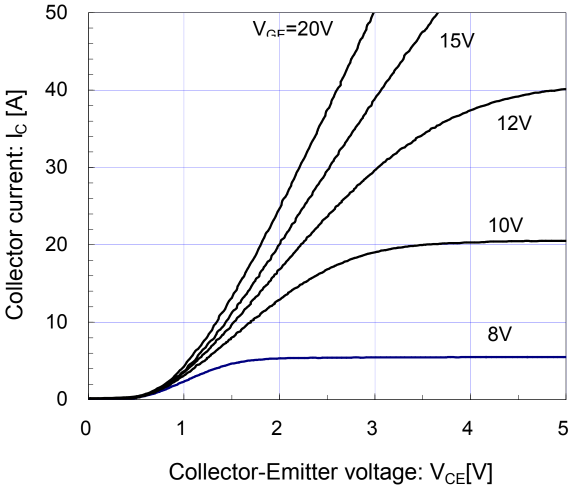
[Thermistor]
Temperature characteristic (typ.)



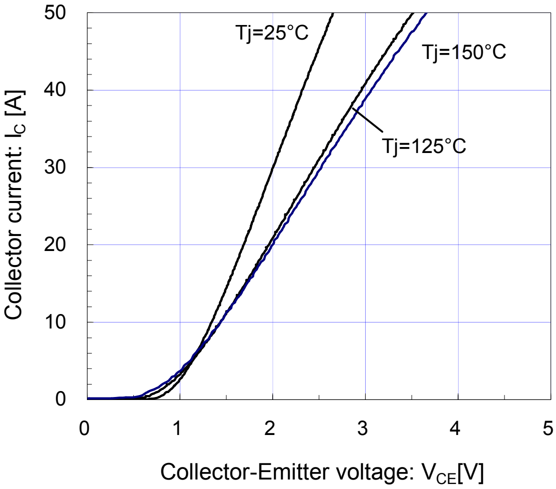
[Brake]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



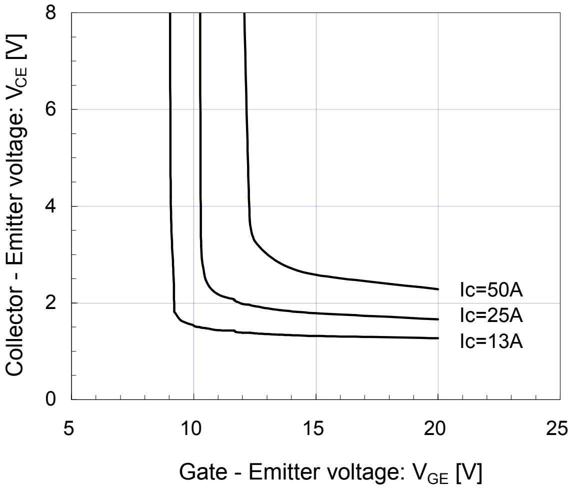
[Brake]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



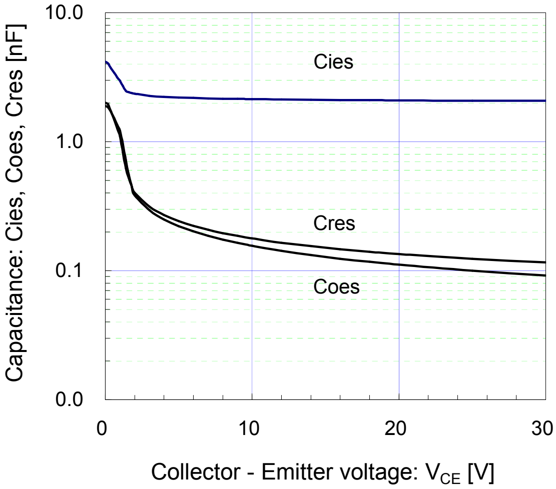
[Brake]
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



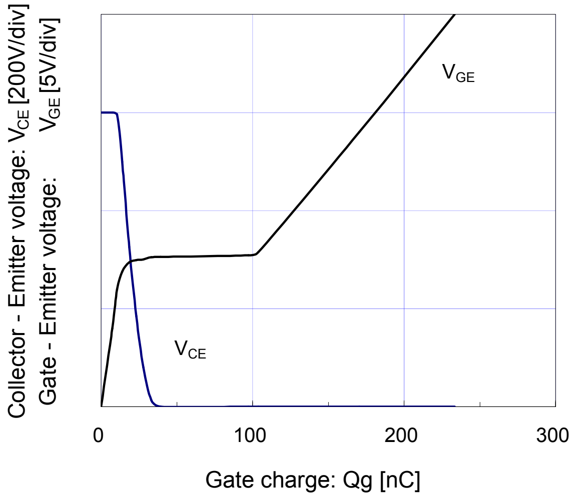
[Brake]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



[Brake]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C

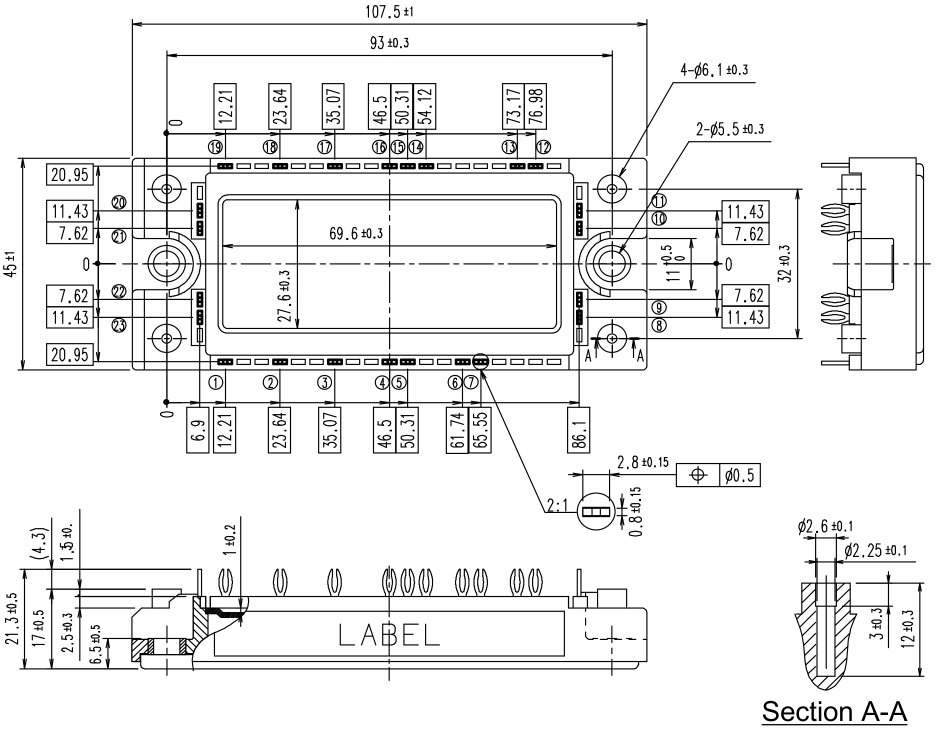


[Brake]
Dynamic gate charge (typ.)
Vcc=600V, Ic=35A, Tj= 25°C

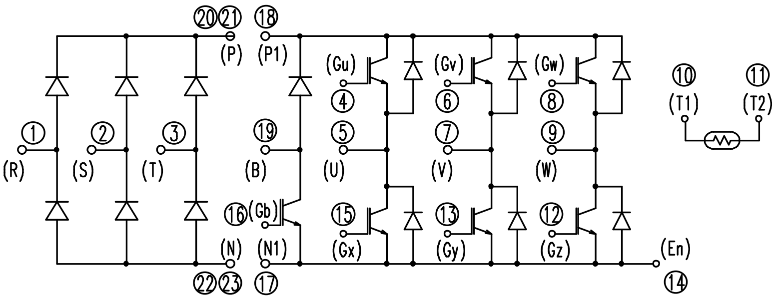


■ Outline Drawings, mm

▭ shows theoretical dimension.
(   ) shows reference dimension.



■ Equivalent Circuit Schematic



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• Submarine repeater equipment

7.

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