

2MBI600VX-120-50

IGBT Modules

Power Module (V series)
1200V / 600A / 2-in-1 package

■ Features

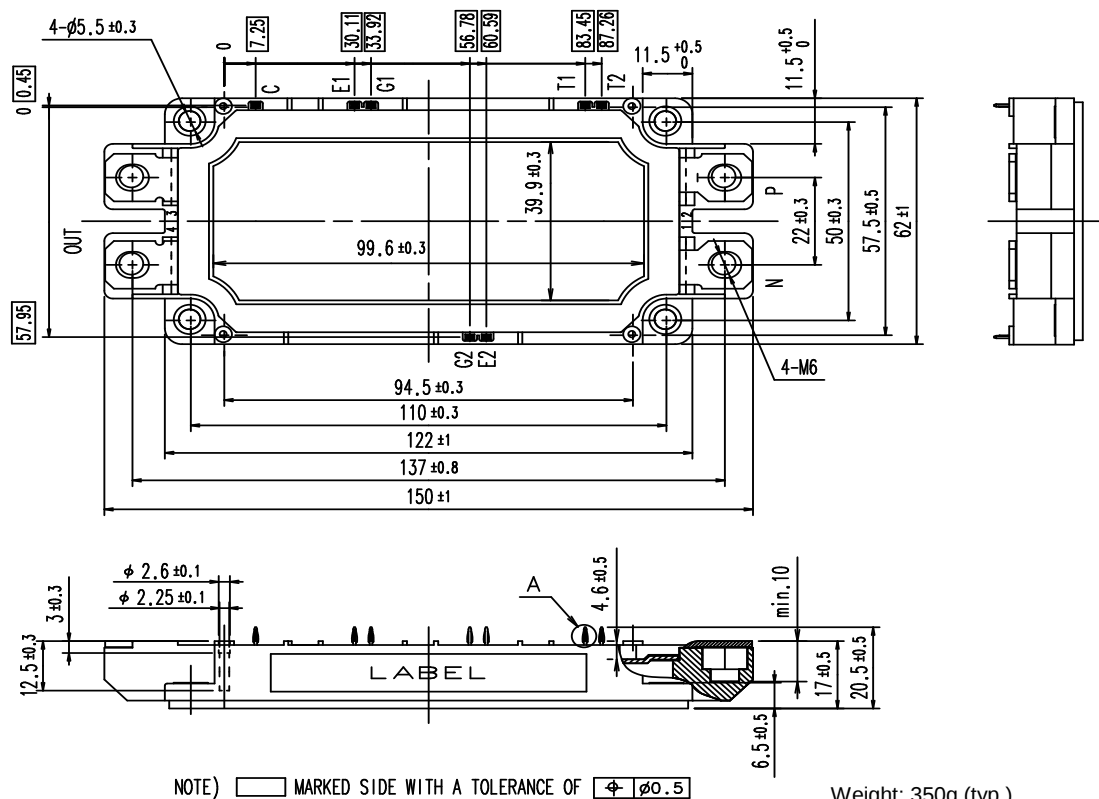
- Low $V_{CE(sat)}$
- Low Inductance Module structure
- Solderless press-fit terminals

■ Applications

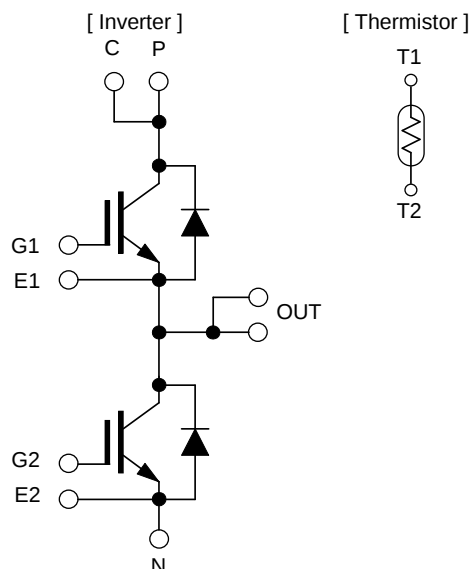
- Inverter for Motor Drives, AC and DC Servo Drives
- Uninterruptible Power Supply Systems, Wind Turbines, PV Power Conditioning Systems



■ Outline drawing (Unit : mm)



■ Equivalent Circuit



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■ Absolute Maximum Ratings (at $T_C = 25^\circ\text{C}$ unless otherwise specified)

Items		Symbols	Conditions	Maximum Ratings	Units
Collector-Emitter voltage		V_{CES}		1200	V
Gate-Emitter voltage		V_{GES}		± 20	V
Collector current		I_C	Continuous	$T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	750 600
		I_C pulse	1ms	1200	A
		$-I_C$		600	
		$-I_C$ pulse	1ms	1200	
Collector power dissipation		P_C	1 device	3750	W
Junction temperature		T_j		175	$^\circ\text{C}$
Operating junction temperature (under switching conditions)		T_{jop}		150	
Case temperature		T_C		125	
Storage temperature		T_{stg}		-40 ~ 125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	AC: 1min.	2500	VAC
	between thermistor and others (*2)				
Screw Torque	Mounting (*3)	-		3.5	N m
	Terminals (*4)	-		4.5	

(*1) All terminals should be connected together during the test.

(*2) Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

(*3) Recommendable Value : 2.5-3.5 Nm (M5)

(*4) Recommendable Value : 3.5-4.5 Nm (M6)

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■ Electrical characteristics (at $T_j = 25^\circ\text{C}$ unless otherwise specified)

Items	Symbols	Conditions		Characteristics			Units
				min.	typ.	max.	
Zero gate voltage Collector current	I _{CES}	V _{GE} =0V, V _{CE} =1200V		-	-	3.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} =0V, V _{GE} =±20V		-	-	600	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} =20V, I _C =600mA		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _C = 600A	T _J =25°C	-	2.65	3.10	V
			T _J =125°C	-	3.00	-	
			T _J =150°C	-	3.05	-	
	V _{CE(sat)} (chip)		T _J =25°C	-	1.85	2.30	
			T _J =125°C	-	2.20	-	
			T _J =150°C	-	2.25	-	
Internal gate resistance	R _{G(int)}	-		-	1.25	-	Ω
Input capacitance	C _{ies}	V _{CE} =10V, V _{GE} =0V, f=1MHz		-	48	-	nF
Turn-on time	t _{on}	V _{CC} = 600V I _C = 600A V _{GE} = ±15V R _G = 0.62Ω L _S = 80nH		-	550	-	nsec
	t _r			-	180	-	
	t _{r(l)}			-	120	-	
Turn-off time	t _{off}			-	1050	-	
	t _f			-	110	-	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 600A	T _J =25°C	-	2.50	3.00	V
			T _J =125°C	-	2.65	-	
			T _J =150°C	-	2.60	-	
	V _F (chip)		T _J =25°C	-	1.70	2.15	
			T _J =125°C	-	1.85	-	
			T _J =150°C	-	1.80	-	
Reverse recovery time	t _{rr}	I _F = 600A		-	200	-	nsec
Thermistor Resistance	R	T=25°C		-	5000	-	Ω
		T=100°C		465	495	520	
Thermistor B value	B	T=25/50°C		3305	3375	3450	K

5. Thermal resistance characteristics

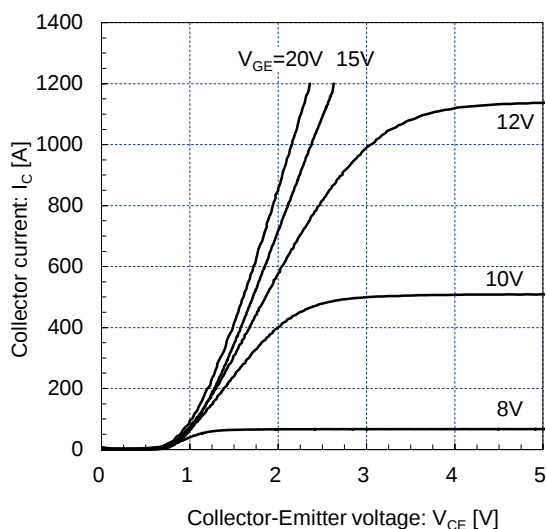
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.04	$^\circ\text{C/W}$
		FWD	-	-	0.06	
Contact thermal resistance (1device) (*1)	$R_{th(c-f)}$	with thermal compound	-	0.0167	-	

(*1) This is the value which is defined mounting on the additional cooling fin with thermal compound.

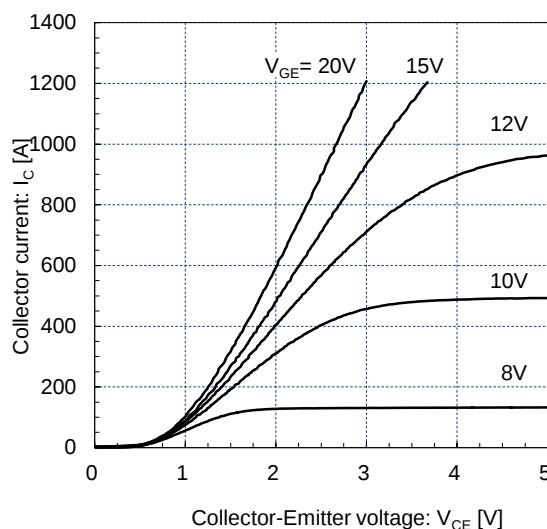
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IGBT Modules

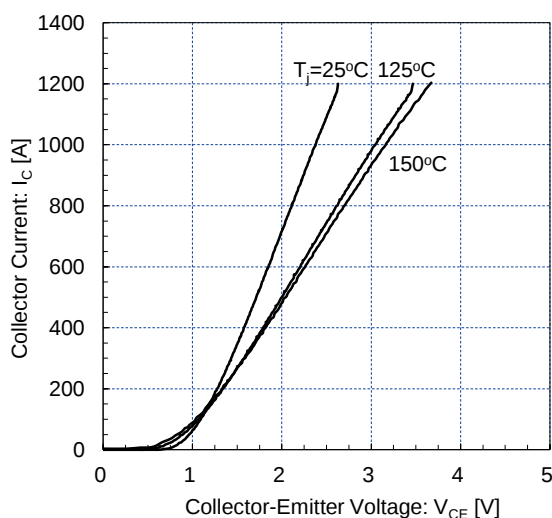
Collector current vs. Collector-Emitter voltage
 $T_j = 25^\circ\text{C}$ / chip



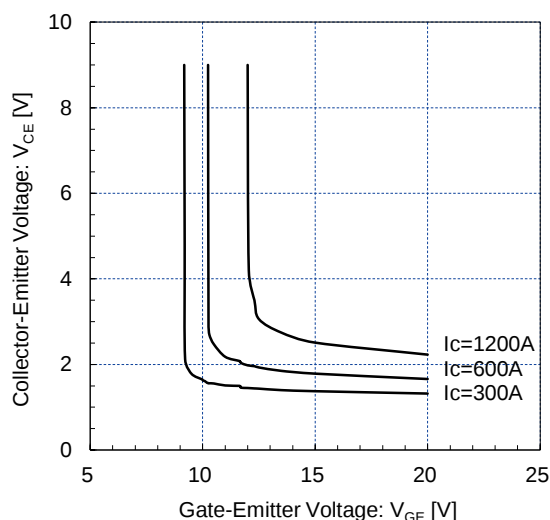
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



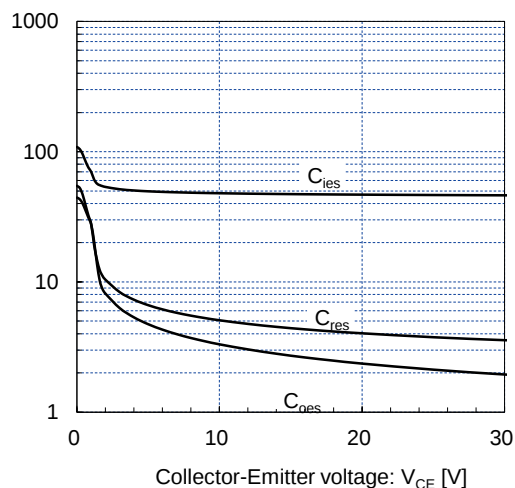
Collector current vs. Collector-Emitter voltage
 $V_{GE} = 15\text{V}$ / chip



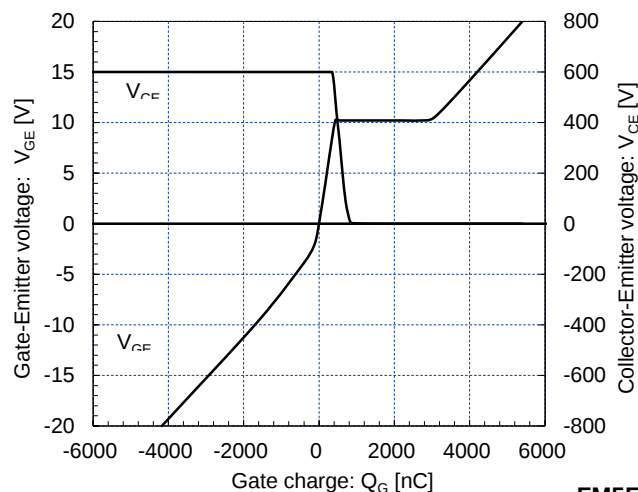
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_j = 25^\circ\text{C}$ / chip



Capacitance vs. Collector-Emitter Voltage
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



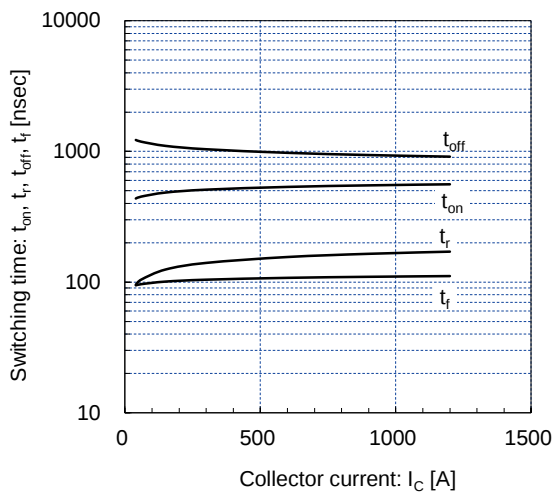
Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_C = 600\text{A}$, $T_j = 25^\circ\text{C}$



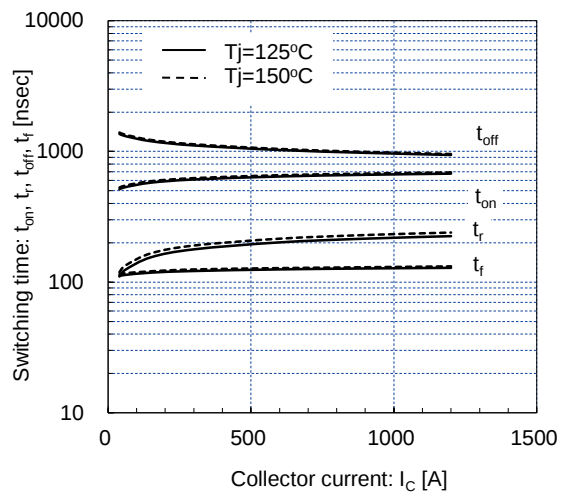
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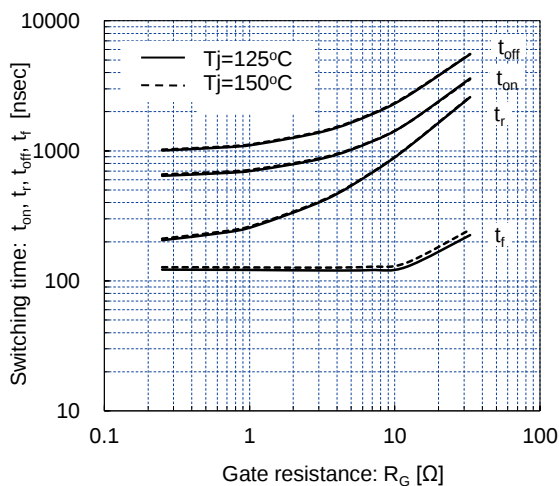
Switching time vs. Collector current (typ.)
V_{cc}=600V, V_{GE}=±15V, R_g=0.62Ω, T_j=25°C



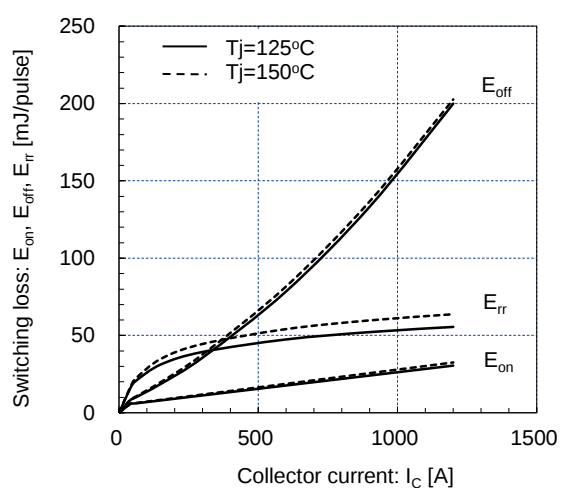
Switching time vs. Collector current (typ.)
V_{cc}=600V, V_{GE}=±15V, R_g=0.62Ω, T_j=125°C, 150°C



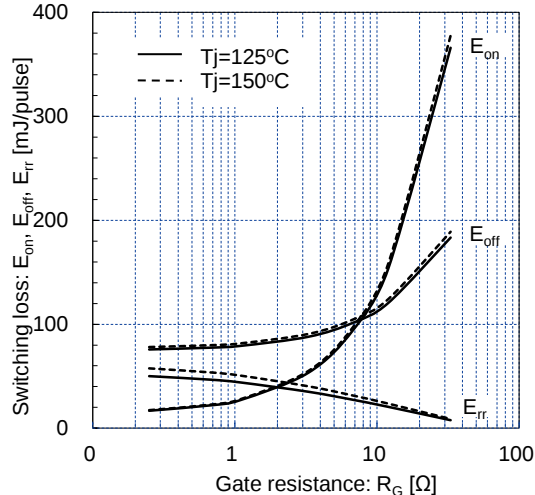
Switching time vs. Gate resistance (typ.)
V_{cc}=600V, I_c=600A, V_{GE}=±15V, T_j=125°C, 150°C



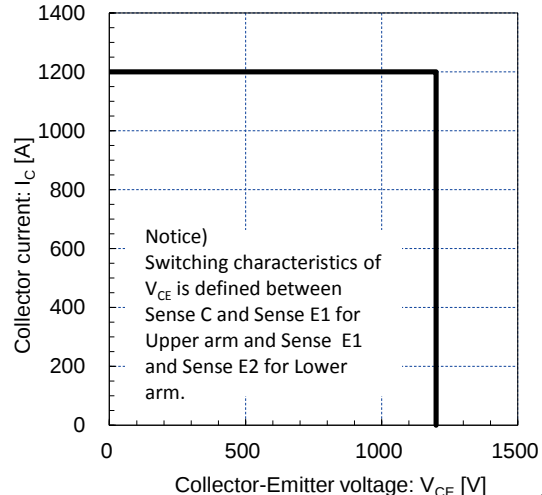
Switching loss vs. Collector current (typ.)
V_{cc}=600V, V_{GE}=±15V, R_g=0.62Ω, T_j=125°C, 150°C



Switching loss vs. Gate resistance (typ.)
V_{cc}=600V, I_c=600A, V_{GE}=±15V, T_j=125°C, 150°C



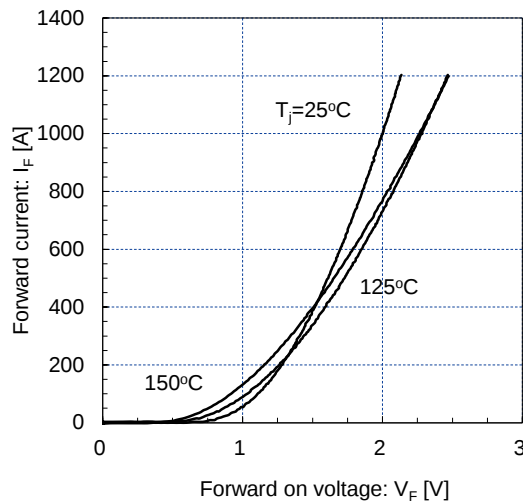
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, R_g=0.62Ω, T_j=150°C



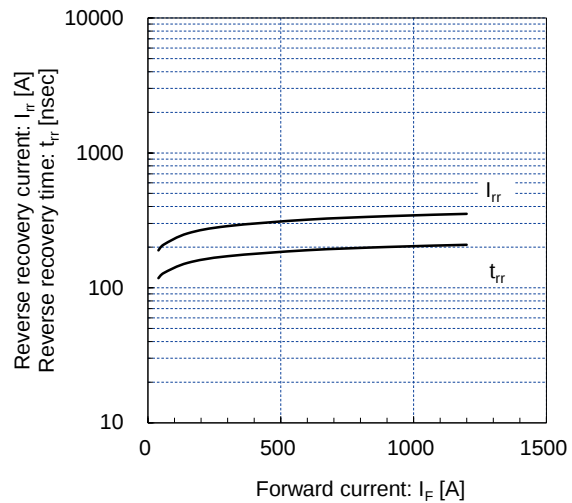
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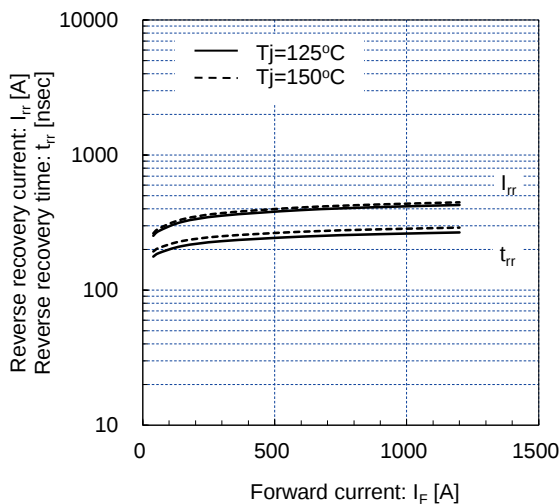
Forward current vs. Forward vltage (typ.)
chip



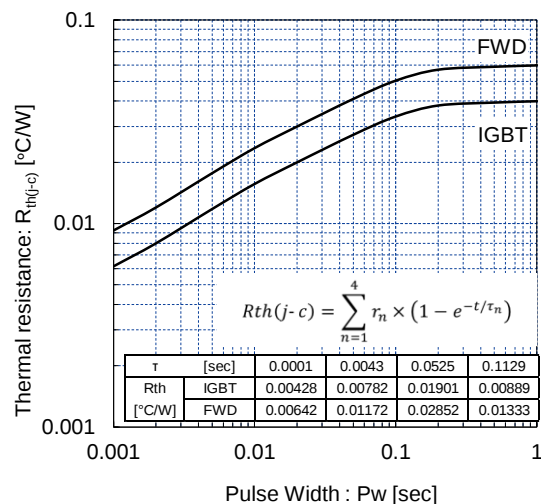
Reverse recovery characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_g=0.62Ω, T_J=25°C



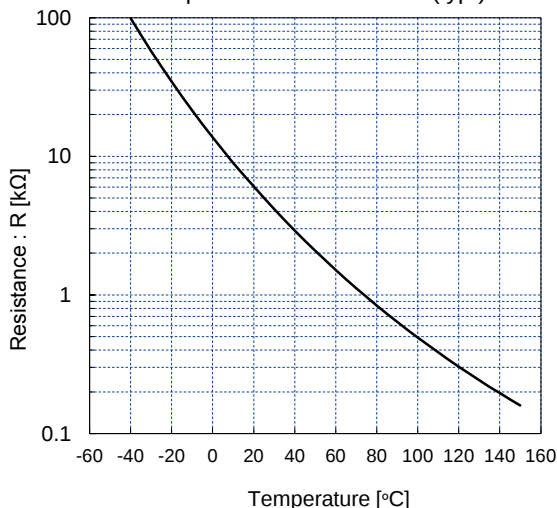
Reverse Recovery Characteristics (typ.)
T_J=125°C, 150°C



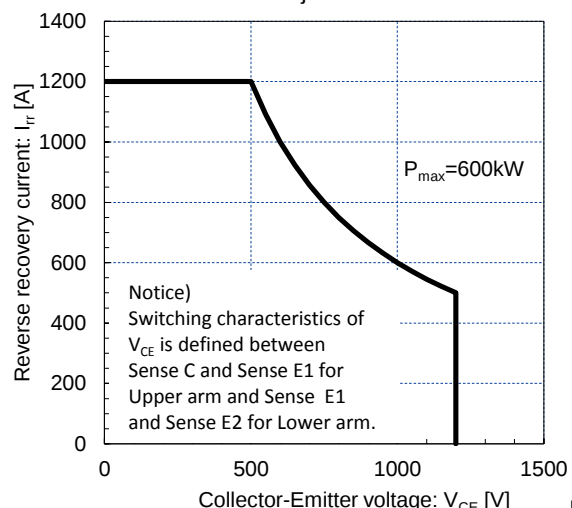
Transient Thermal Resistance (max.)



[THERMISTOR]
Temperature characteristic (typ.)



FWD safe operating area (max.)
T_J=150°C



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