

2MBI300VN-120S-50

IGBT Modules

Power Module (V series)
1200V / 300A / 2-in-1 package

■ Features

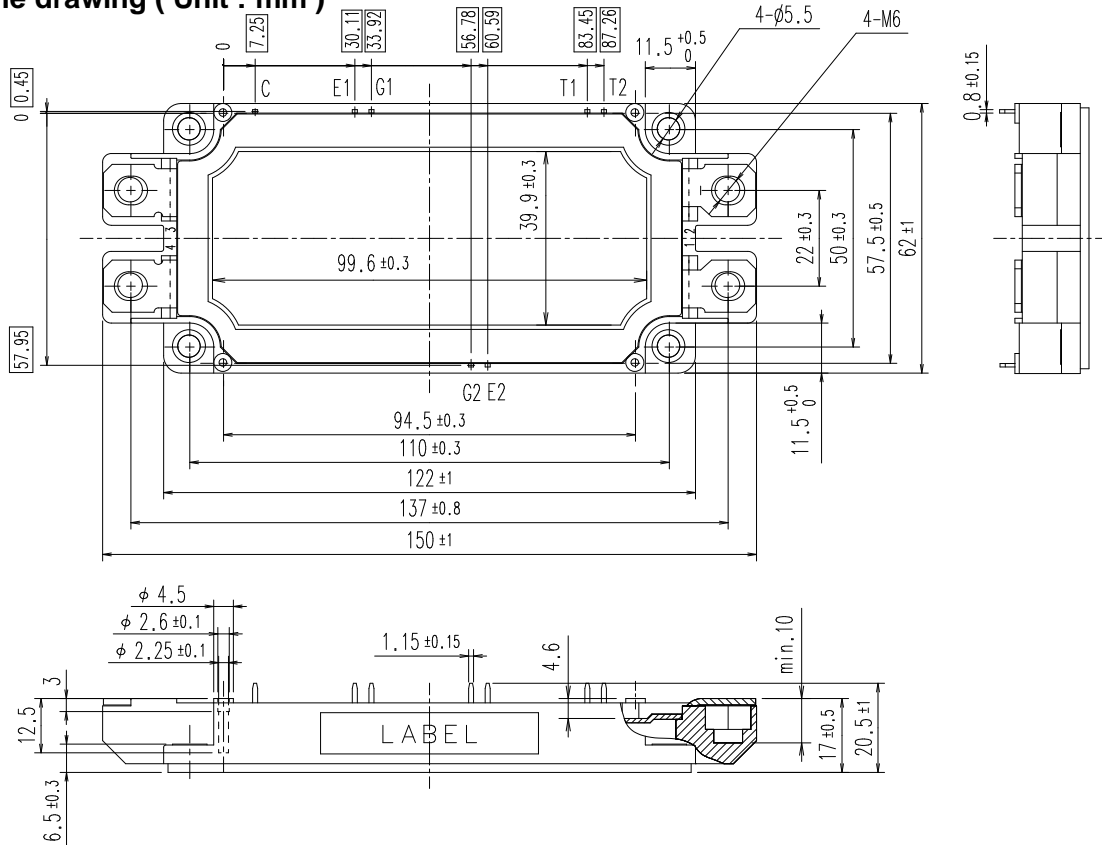
- Low $V_{CE(sat)}$
- Low Inductance Module structure
- Solder pin terminals

■ Applications

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



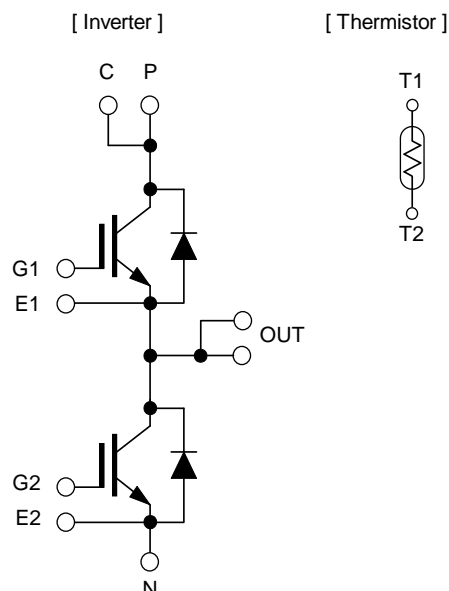
■ Outline drawing (Unit : mm)



Weight: 300g (typ.)

NOTE) shows theoretical demension and tolerance is ± 0.5

■ 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	$T_c = 25^\circ\text{C}$	450	A
				$T_c = 100^\circ\text{C}$	300	
		I_C pulse	1ms		600	
		$-I_C$			300	
		$-I_C$ pulse	1ms		600	
Collector power dissipation		P_C	1 device		2000	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}	$V_{CE}=0V, V_{GE}=\pm 20V$		-	-	600	nA
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=20V, I_C=300mA$		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE}=15V$ $I_C=300A$	$T_j=25^{\circ}C$	-	2.20	2.65	V
			$T_j=125^{\circ}C$	-	2.50	-	
			$T_j=150^{\circ}C$	-	2.55	-	
	$V_{CE(sat)}$ (chip)		$T_j=25^{\circ}C$	-	1.75	2.20	
			$T_j=125^{\circ}C$	-	2.05	-	
			$T_j=150^{\circ}C$	-	2.10	-	
Internal gate resistance	$R_{G(int)}$	-		-	2.5	-	Ω
Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$		-	27	-	nF
Turn-on time	t_{on}	$V_{CC}=600V \quad I_C=300A$ $V_{GE}=\pm 15V \quad R_G=0.93\Omega$ $L_s=30nH$		-	450	-	nsec
	t_r			-	100	-	
	$t_{r(l)}$			-	50	-	
Turn-off time	t_{off}			-	650	-	
	t_f			-	55	-	
Forward on voltage	V_F (terminal)	$V_{GE}=0V$ $I_F=300A$	$T_j=25^{\circ}C$	-	2.15	2.60	V
			$T_j=125^{\circ}C$	-	2.30	-	
			$T_j=150^{\circ}C$	-	2.25	-	
	V_F (chip)		$T_j=25^{\circ}C$	-	1.70	2.15	
			$T_j=125^{\circ}C$	-	1.85	-	
			$T_j=150^{\circ}C$	-	1.80	-	
Reverse recovery time	t_{rr}	$I_F=300A$		-	100	-	nsec
Thermistor resistance	R	$T=25^{\circ}C$		-	5000	-	Ω
		$T=100^{\circ}C$		465	495	520	
Thermistor B value	B	$T=25/50^{\circ}C$		3305	3375	3450	K

5. Thermal resistance characteristics

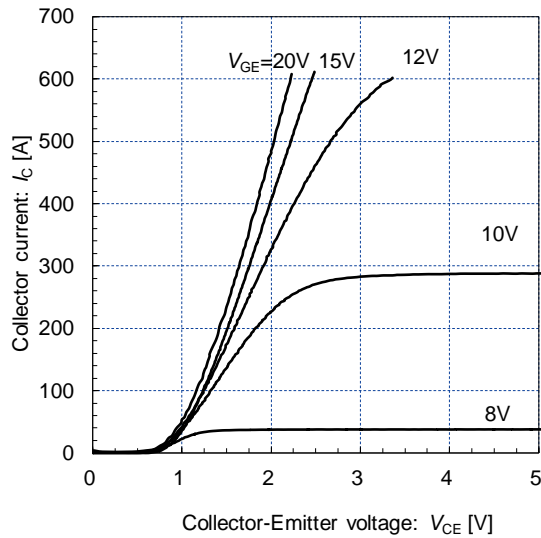
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.075	$^\circ\text{C/W}$
		FWD	-	-	0.120	
Contact thermal resistance (1device) (*1)	$R_{th(c-f)}$	with thermal compound	-	0.0167	-	

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

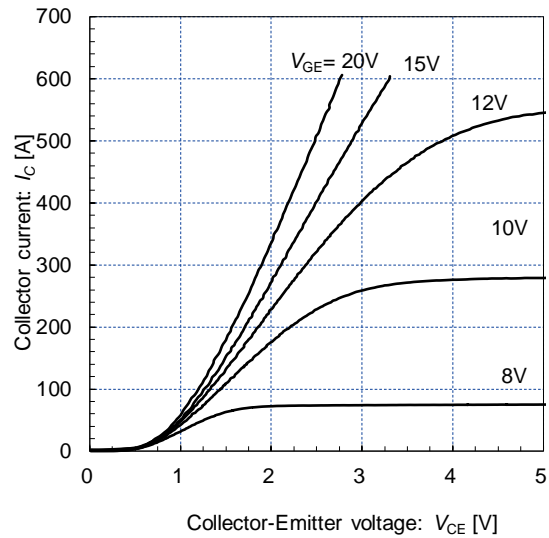
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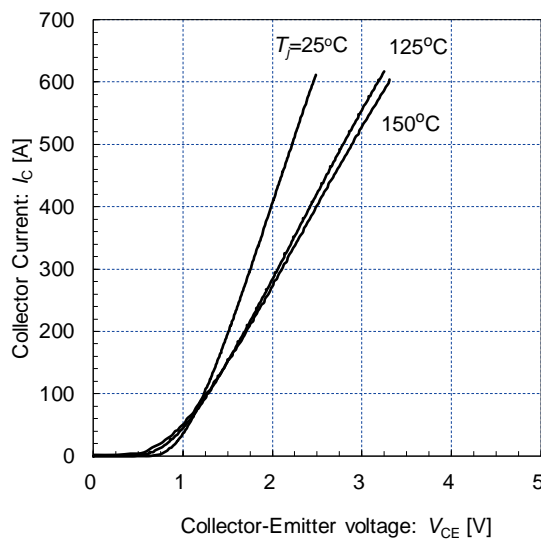
Collector current vs. Collector-Emitter voltage
 $T_j = 25^\circ\text{C}$ / chip



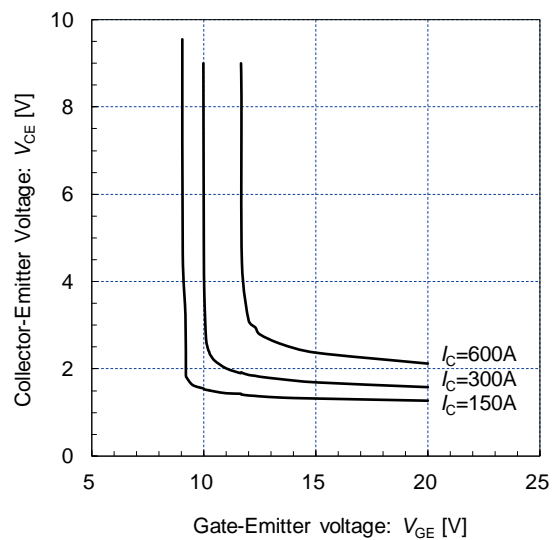
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



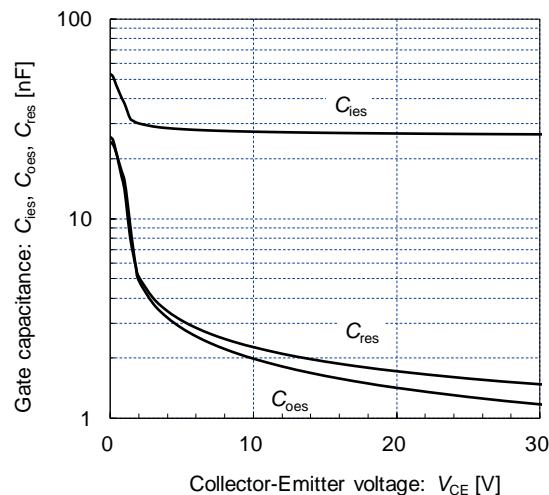
Collector current vs. Collector-Emitter voltage
 $V_{GE} = 15\text{V}$ / chip



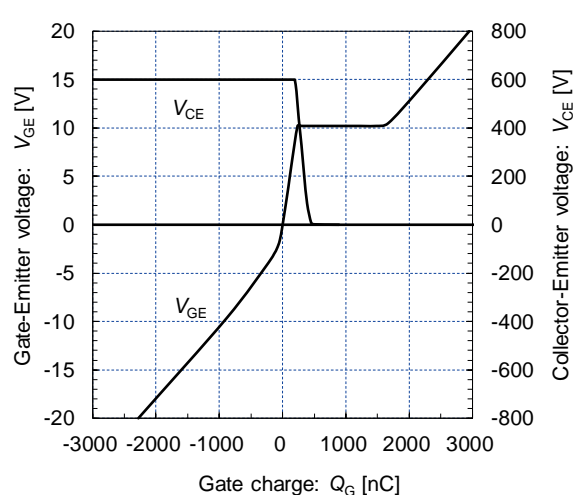
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



Gate capacitance vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



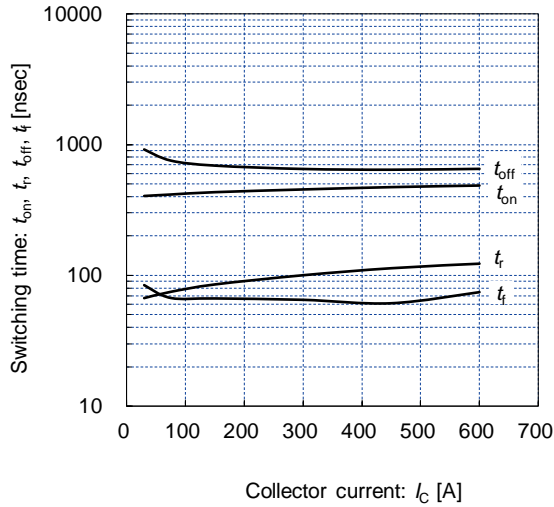
Dynamic gate charge (typ.)
 $V_{CC} = 600\text{V}$, $I_C = 300\text{A}$, $T_j = 25^\circ\text{C}$



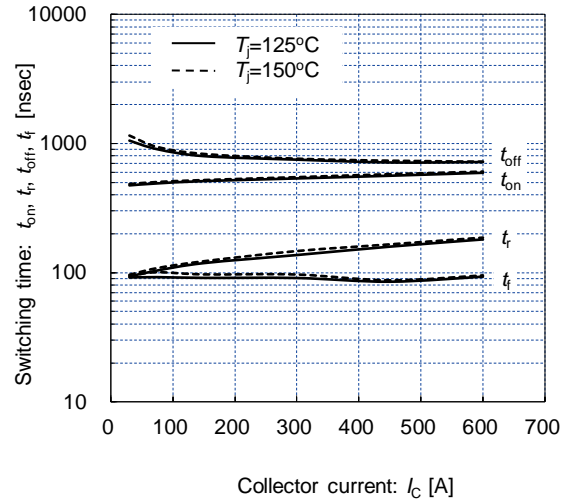
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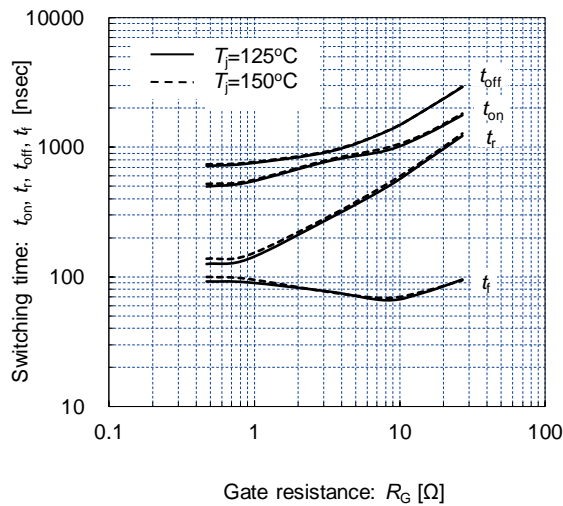
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=0.93\Omega$, $T_j=25^\circ C$



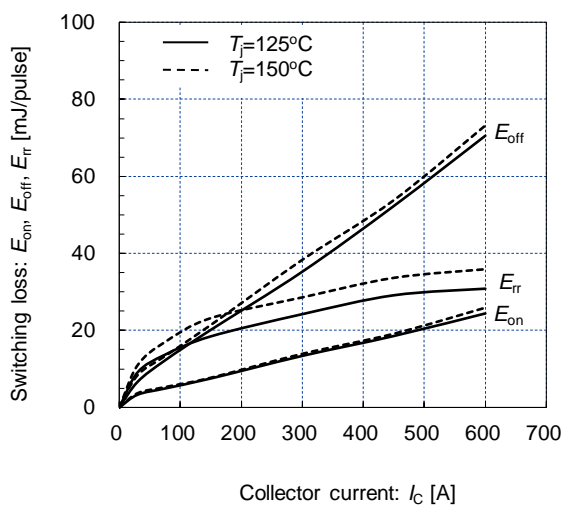
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=0.93\Omega$, $T_j=125^\circ C$, $150^\circ C$



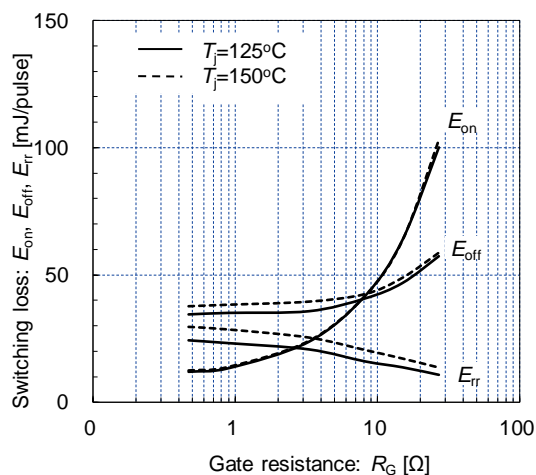
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=300A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$, $150^\circ C$



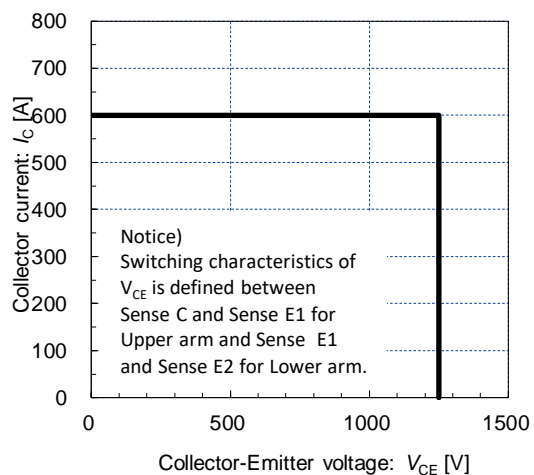
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=0.93\Omega$, $T_j=125^\circ C$, $150^\circ C$



Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=300A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$, $150^\circ C$



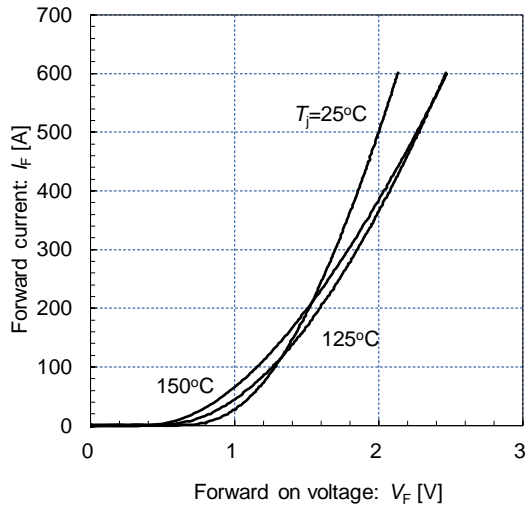
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=0.93\Omega$, $T_j=150^\circ C$



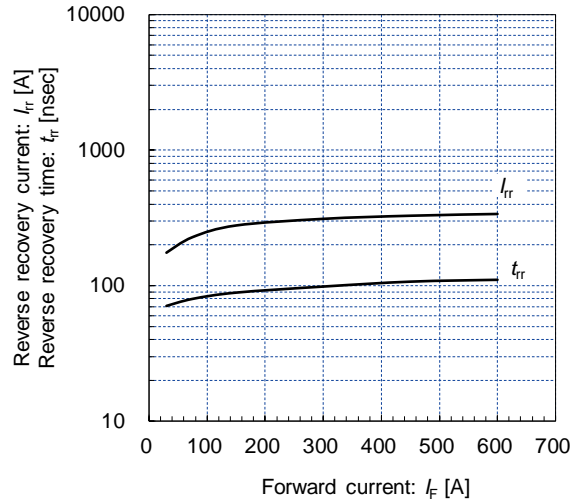
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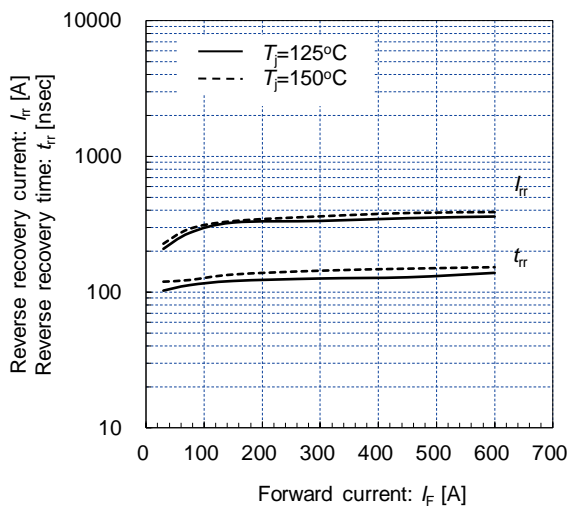
Forward current vs. Forward voltage (typ.)
chip



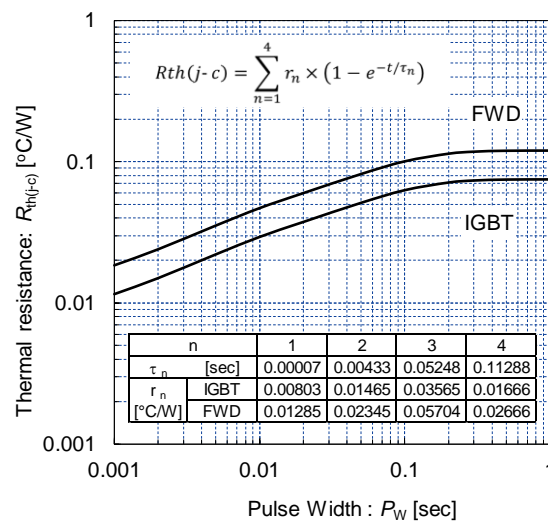
Reverse recovery characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=0.93\Omega$, $T_J=25^\circ C$



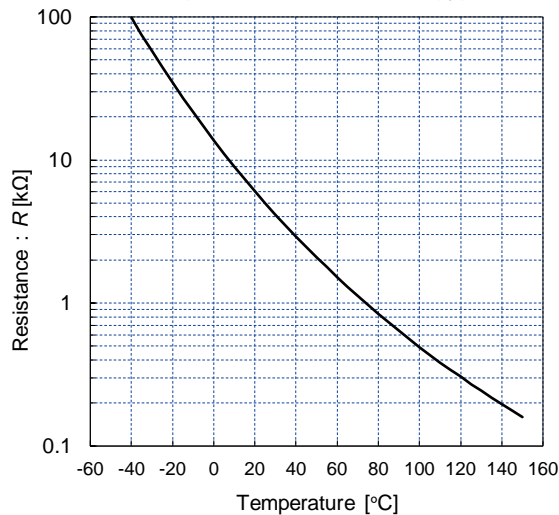
Reverse recovery characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=0.93\Omega$, $T_J=125^\circ C, 150^\circ C$



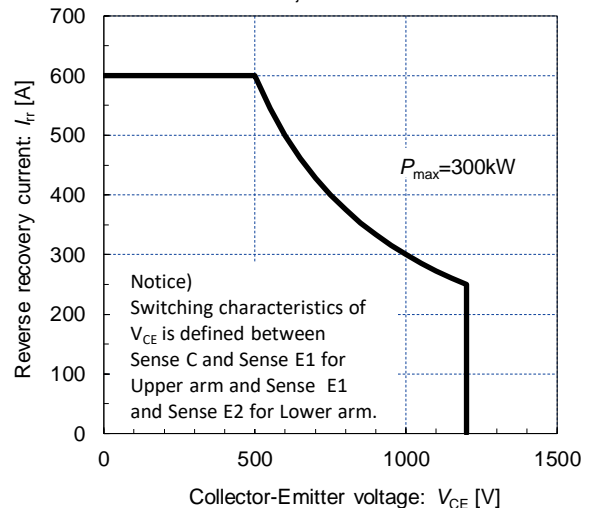
Transient thermal resistance (max.)



[Thermistor]
Temperature characteristic (typ.)



FWD safe operating area (max.)
 $T_J=150^\circ C$



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