

# 2MBI300VN-120S-50

IGBT Modules

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

■ Features

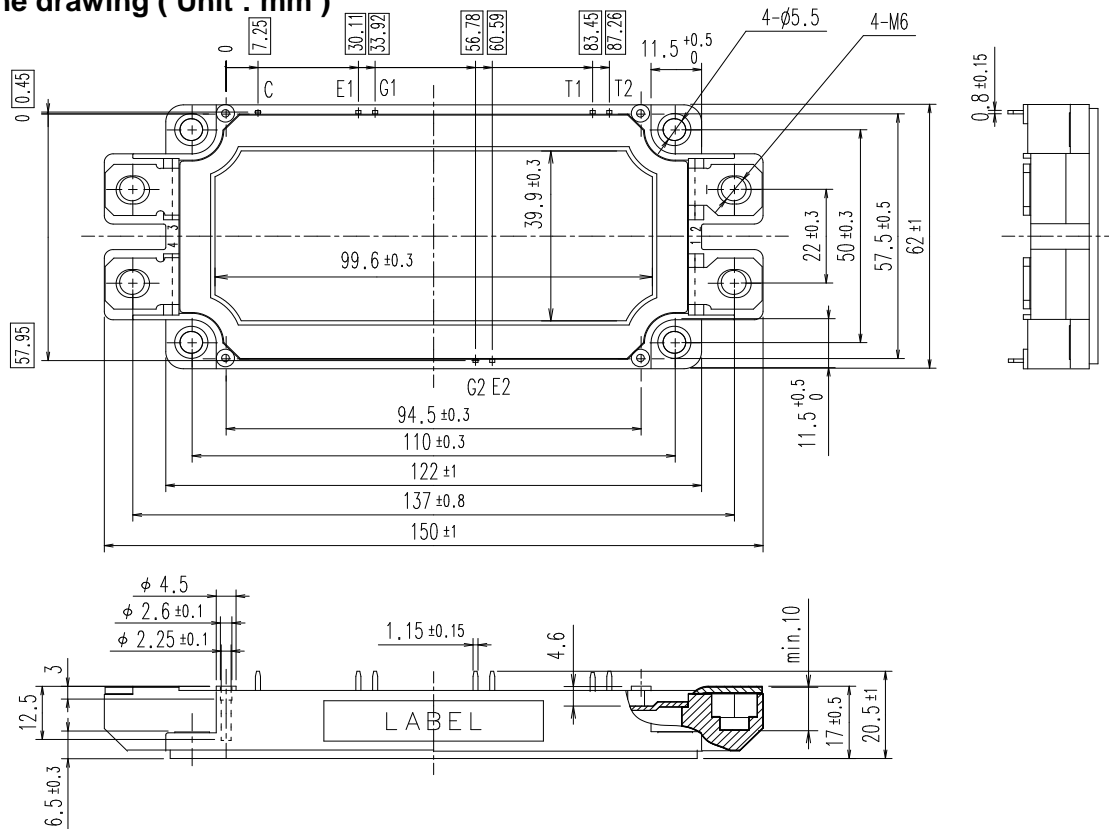
- Low  $V_{CE(sat)}$
- Low Inductance Module structure
- Solderless press-fit terminals

■ Applications

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

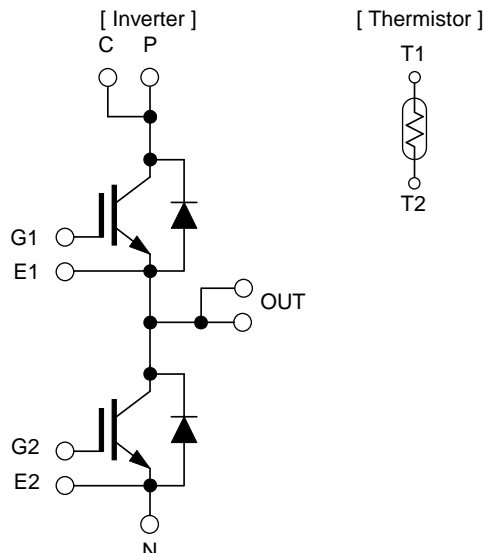


■ Outline drawing ( Unit : mm )



Weight: 300g (typ.)

■ Equivalent Circuit



# 2MBI300VN-120S-50

**IGBT Modules**
**■ 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		$V_{GES}$		$\pm 20$	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	°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)	$V_{GE} = 15V$ $I_C = 300A$	$T_j=25^\circ\text{C}$	-	2.20	2.65	V
			$T_j=125^\circ\text{C}$	-	2.50	-	
			$T_j=150^\circ\text{C}$	-	2.55	-	
	$V_{CE(sat)}$ (chip)		$T_j=25^\circ\text{C}$	-	1.75	2.20	
			$T_j=125^\circ\text{C}$	-	2.05	-	
			$T_j=150^\circ\text{C}$	-	2.10	-	
Internal gate resistance	$R_{G(int)}$	-	-	2.5	-	$\Omega$	
Input capacitance	$C_{ies}$	$V_{CE}=10V, V_{GE}=0V, f=1MHz$	-	27	-	nF	
Turn-on time	$t_{on}$	$V_{CC}= 600V$ $I_C= 300A$ $V_{GE}= \pm 15V$ $R_G= 0.93\Omega$ $L_s= 30nH$	-	450	-	nsec	
	$t_r$		-	100	-		
	$t_{r(i)}$		-	50	-		
Turn-off time	$t_{off}$		-	650	-		
	$t_f$		-	55	-		
Forward on voltage	$V_F$ (terminal)		$V_{GE} = 0V$ $I_F = 300A$	$T_j=25^\circ\text{C}$	-		2.15
		$T_j=125^\circ\text{C}$		-	2.30	-	
		$T_j=150^\circ\text{C}$		-	2.25	-	
	$V_F$ (chip)	$T_j=25^\circ\text{C}$		-	1.70	2.15	
		$T_j=125^\circ\text{C}$		-	1.85	-	
		$T_j=150^\circ\text{C}$		-	1.80	-	
Reverse recovery time	$t_{rr}$	$I_F = 300A$	-	100	-	nsec	
Thermistor Resistance	R	$T=25^\circ\text{C}$	-	5000	-	$\Omega$	
		$T=100^\circ\text{C}$	465	495	520		
Thermistor B value	B	$T=25/50^\circ\text{C}$	3305	3375	3450	K	

5. Thermal resistance characteristics

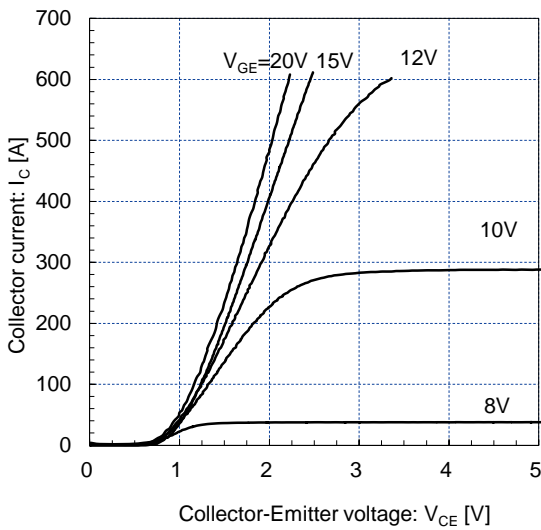
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.075	$^\circ\text{C/W}$
		FWD	-	-	0.120	
Contact thermal resistance (1device) (*1)	$R_{th(c-f)}$	with thermal compound	-	0.0167	-	

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

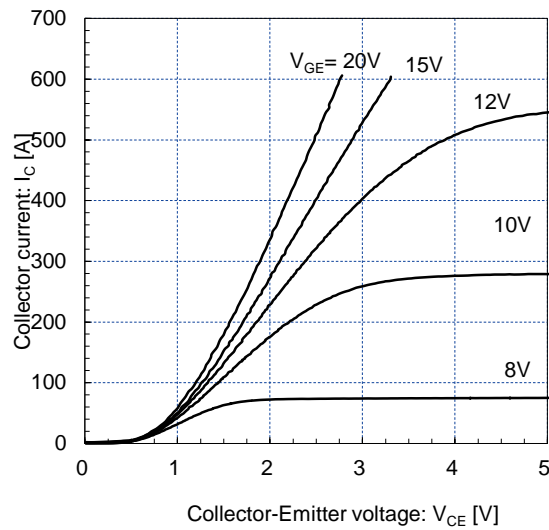
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IGBT Modules

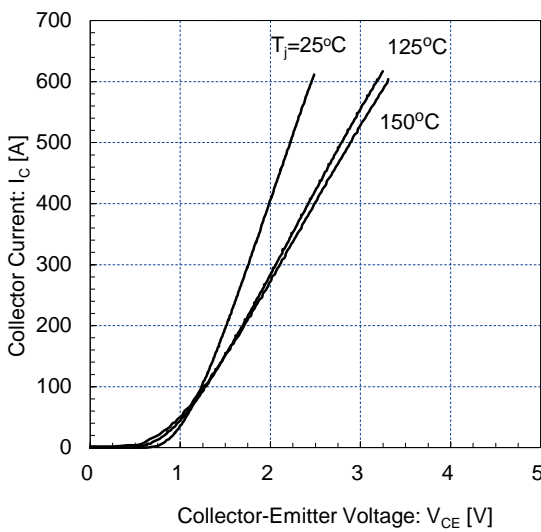
Collector current vs. Collector-Emmitter voltage  
 $T_j = 25^\circ\text{C}$  / chip



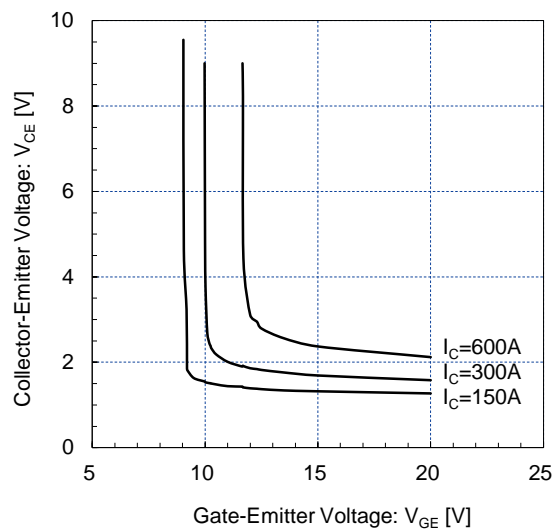
Collector current vs. Collector-Emmitter voltage (typ.)  
 $T_j = 150^\circ\text{C}$  / chip



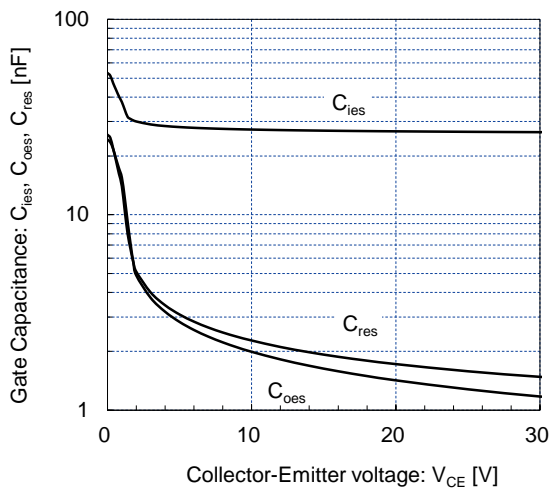
Collector current vs. Collector-Emmitter voltage  
 $V_{GE} = 15\text{V}$  / chip



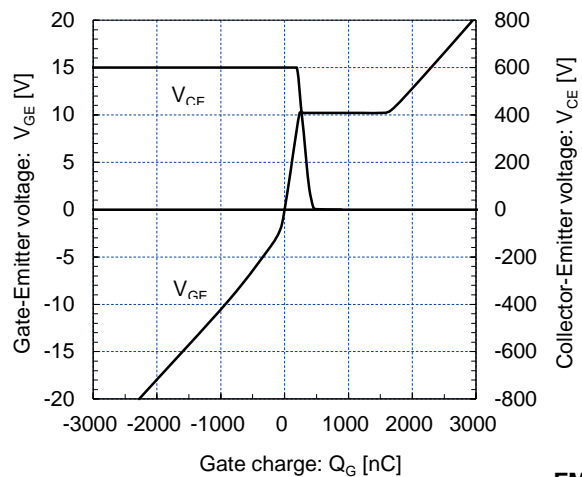
Collector-Emmitter voltage vs. Gate-Emmitter voltage  
 $T_j = 25^\circ\text{C}$  / chip



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



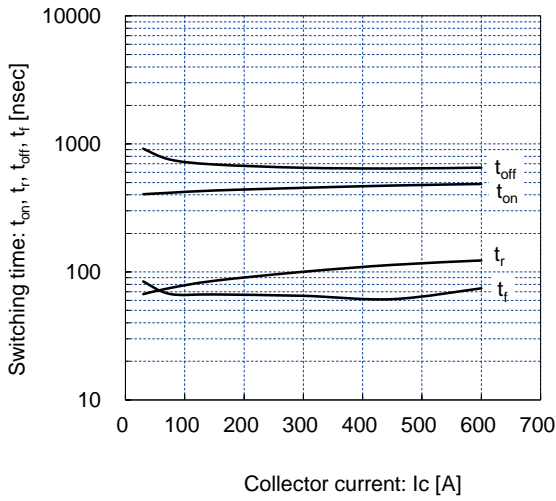
Dynamic Gate Charge (typ.)  
 $V_{CC} = 600\text{V}$ ,  $I_C = 300\text{A}$ ,  $T_j = 25^\circ\text{C}$



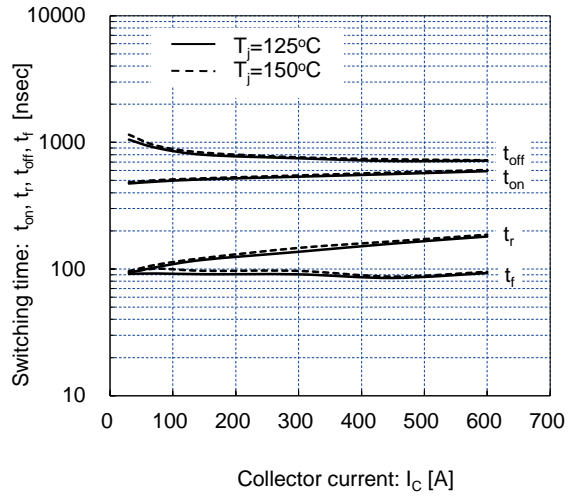
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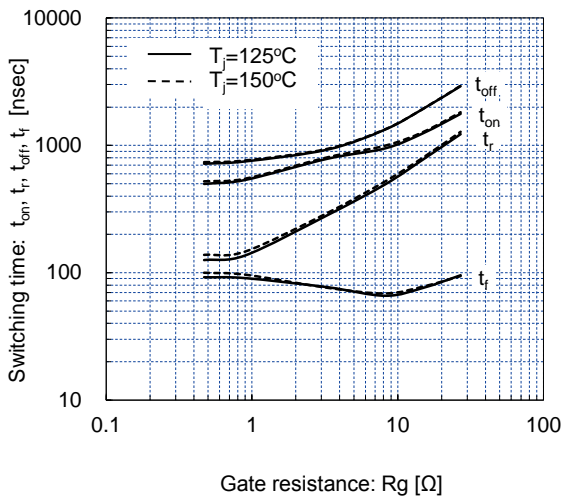
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=25^\circ C$



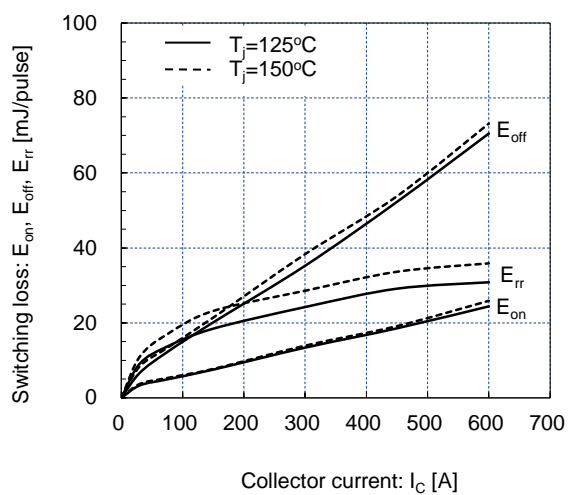
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



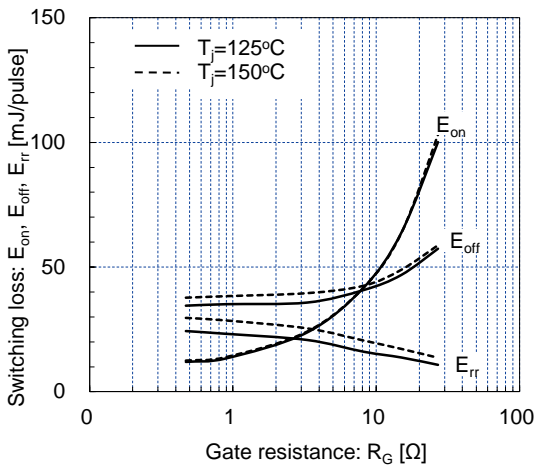
Switching time vs. Gate resistance (typ.)  
 $V_{cc}=600V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



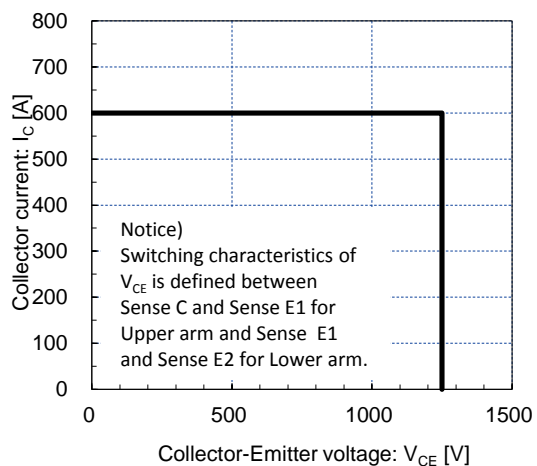
Switching loss vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



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



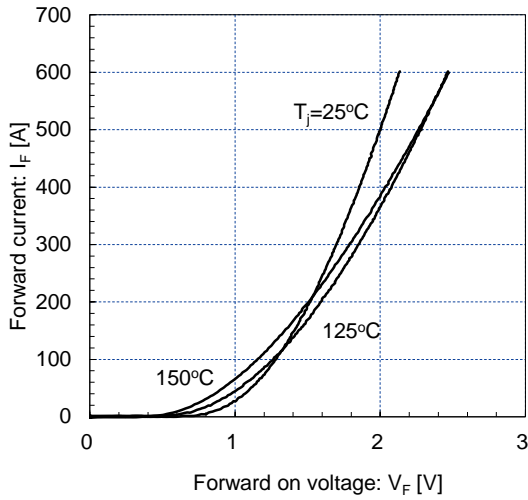
Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE}=15V, R_g=0.93\Omega, T_j=150^\circ C$



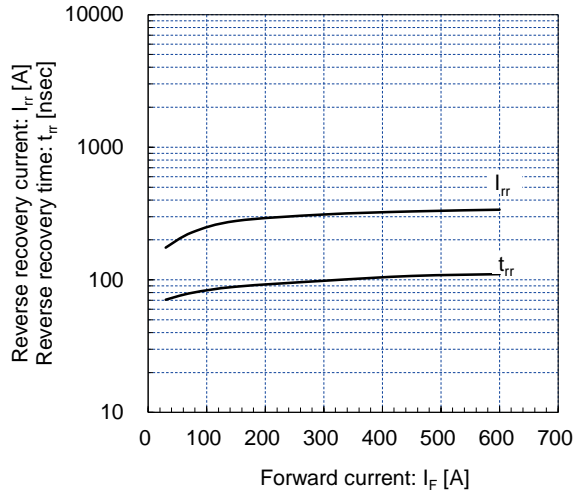
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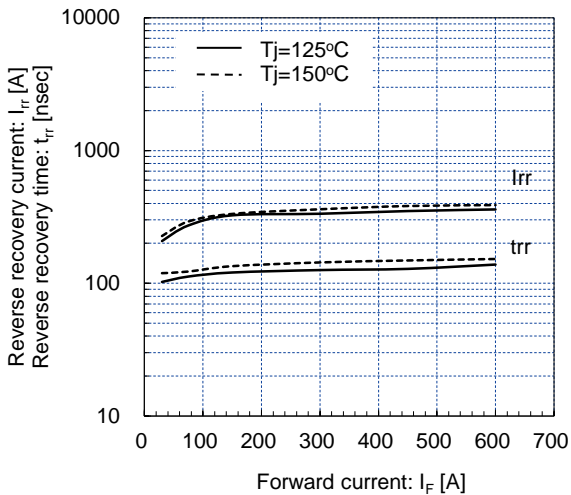
Forward current vs. Forward vltage (typ.)  
chip



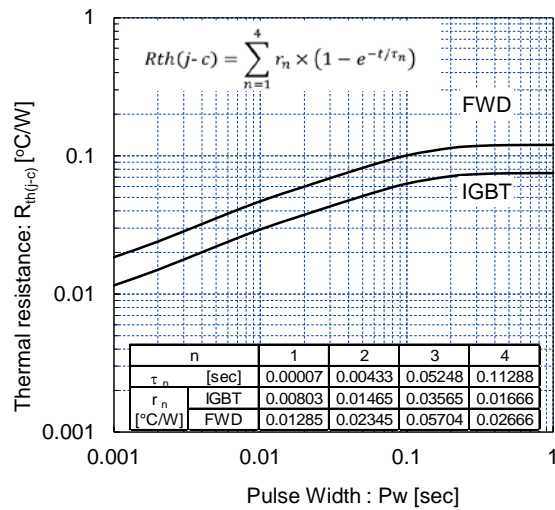
Reverse recovery characteristics (typ.)  
 $V_{CC}=600\text{V}$ ,  $V_{GE}=\pm 15\text{V}$ ,  $R_g=0.93\Omega$ ,  $T_j=25^\circ\text{C}$



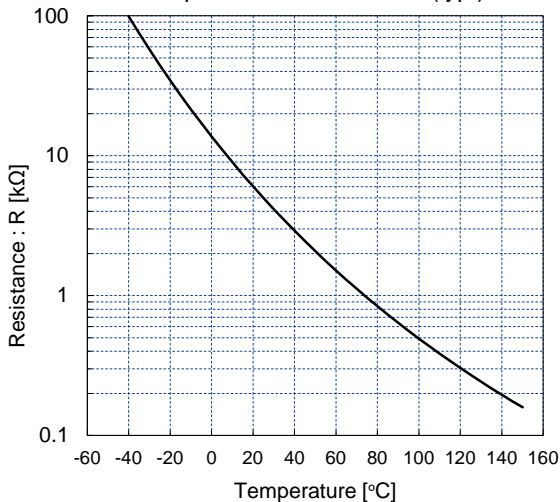
Reverse Recovery Characteristics (typ.)  
 $T_j=125^\circ\text{C}, 150^\circ\text{C}$



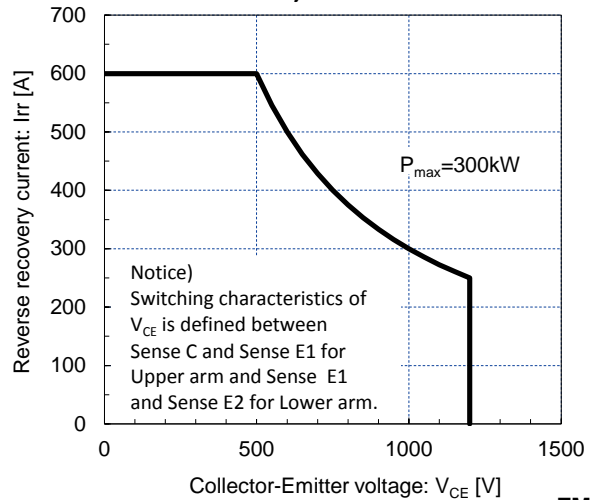
Transient Thermal Resistance (max.)



[THERMISTOR]  
Temperature characteristic (typ.)



FWD safe operating area (max.)  
 $T_j=150^\circ\text{C}$



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