

2MBI450VN-120S-50

IGBT Modules

Power Module (V series)
1200V / 450A / 2-in-1 package

■ **Features**

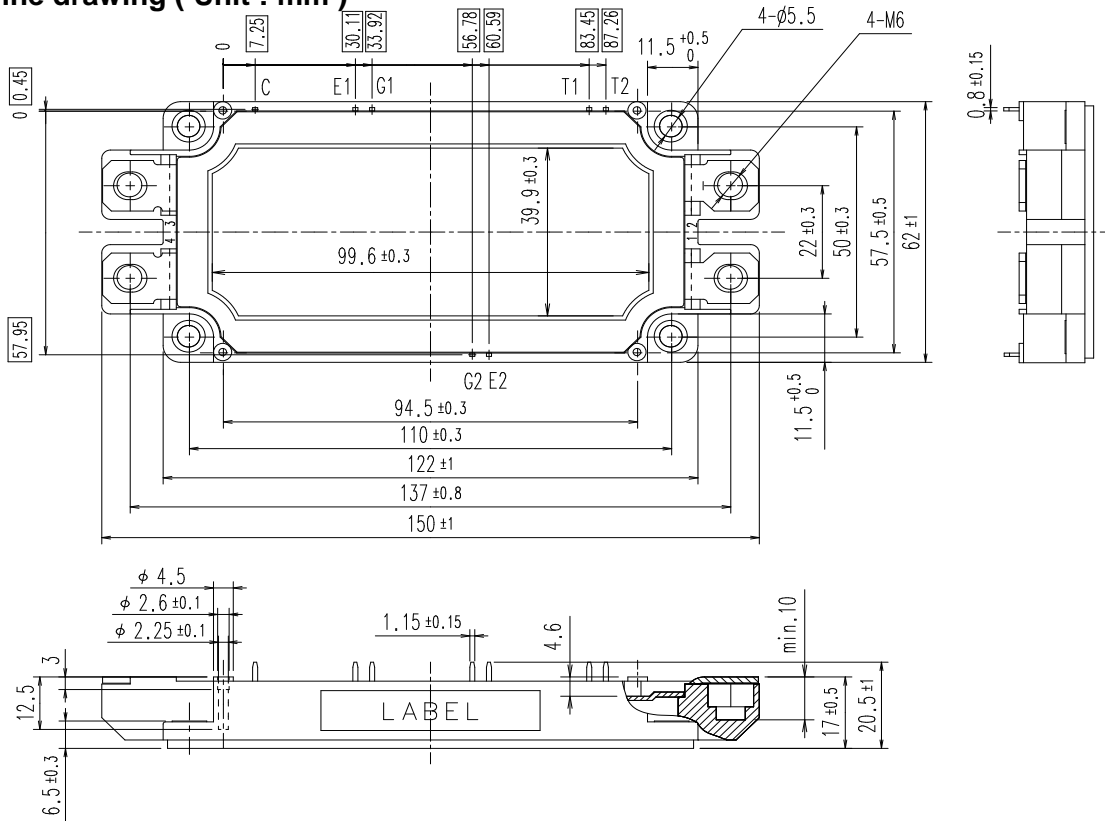
- LOW $V_{CE(sat)}$
- Low Inductance Module structure
- Solderless press-fit terminals

■ **Applications**

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



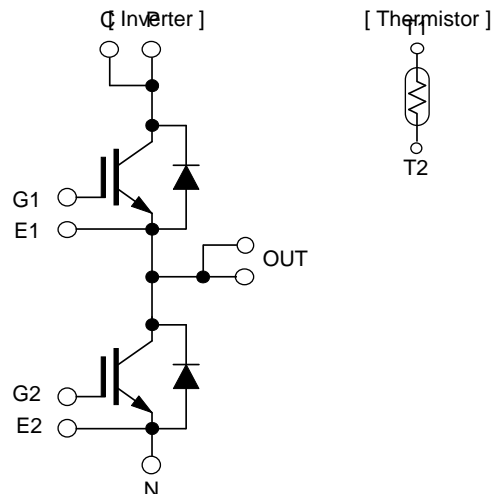
■ **Outline drawing (Unit : mm)**



NOTE) shows theoretical dimension and tolerance is $\oplus \ominus \phi 0.5$

Weight: 300g (typ.)

■ **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	$T_C = 25^\circ\text{C}$	600	A
				$T_C = 100^\circ\text{C}$	450	
	I_C pulse	1ms		900		
	$-I_C$			450		
	$-I_C$ pulse	1ms		900		
Collector power dissipation		P_C	1 device	3000	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	$V_{GE(th)}$	$V_{CE}=20V, I_C=450mA$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 450A$	$T_j=25^\circ\text{C}$	-	2.35	2.80	V
			$T_j=125^\circ\text{C}$	-	2.65	-	
			$T_j=150^\circ\text{C}$	-	2.70	-	
	$V_{CE(sat)}$ (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	$R_{G(int)}$	-	-	1.67	-	Ω	
Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$	-	41	-	nF	
Turn-on time	t_{on}	$V_{CC} = 600V$ $I_C = 450A$ $V_{GE} = \pm 15V$ $R_G = 0.52\Omega$ $L_s = 30nH$	-	470	-	nsec	
	t_r		-	120	-		
	$t_{r(i)}$		-	60	-		
Turn-off time	t_{off}		-	700	-		
	t_f		-	70	-		
Forward on voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 450A$	$T_j=25^\circ\text{C}$	-	2.30	2.75	V
			$T_j=125^\circ\text{C}$	-	2.45	-	
			$T_j=150^\circ\text{C}$	-	2.40	-	
	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}	$I_F = 450A$	-	200	-	nsec	
Thermistor Resistance	R	$T=25^\circ\text{C}$	-	5000	-	Ω	
		$T=100^\circ\text{C}$	465	495	520		
Thermistor B value	B	$T=25/50^\circ\text{C}$	3305	3375	3450	K	

5. Thermal resistance characteristics

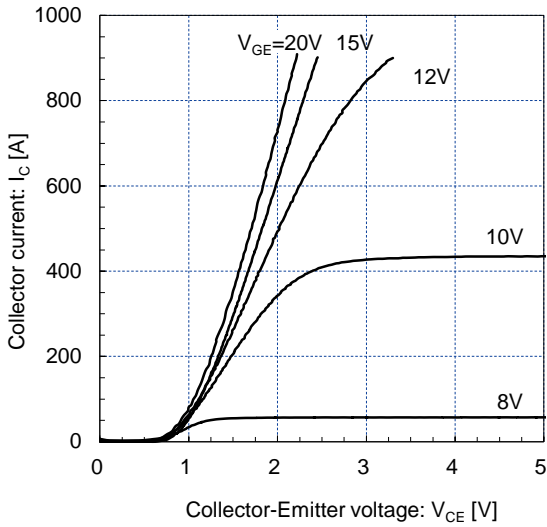
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.050	$^\circ\text{C/W}$
		FWD	-	-	0.078	
Contact thermal resistance (1device) (*1)	$R_{th(c-f)}$	with thermal compound	-	0.0167	-	

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

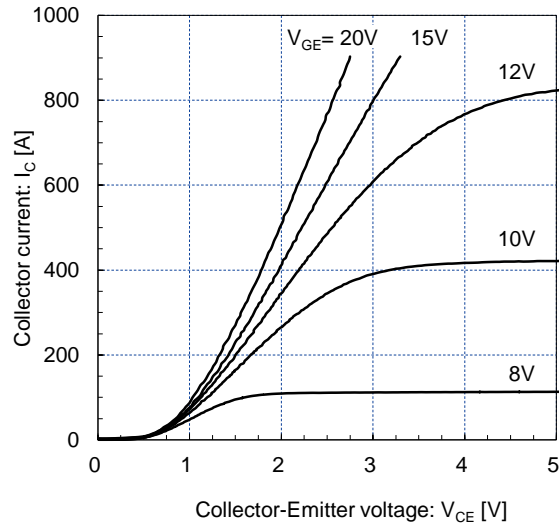
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IGBT Modules

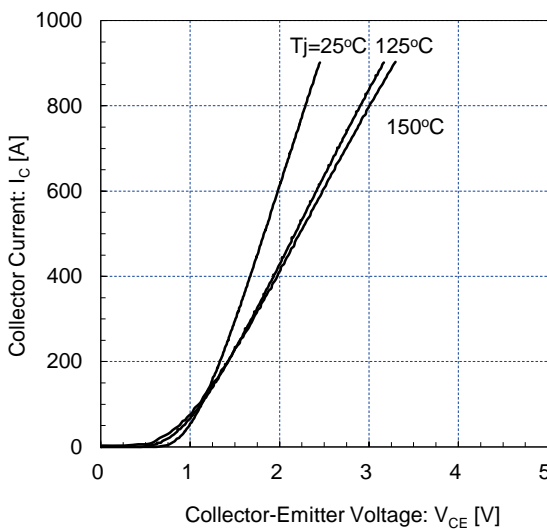
Collector current vs. Collector-Emittor voltage
 $T_j = 25^\circ\text{C}$ / chip



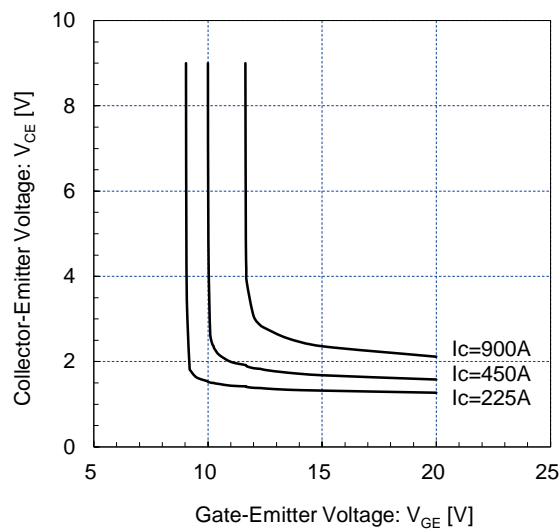
Collector current vs. Collector-Emittor voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



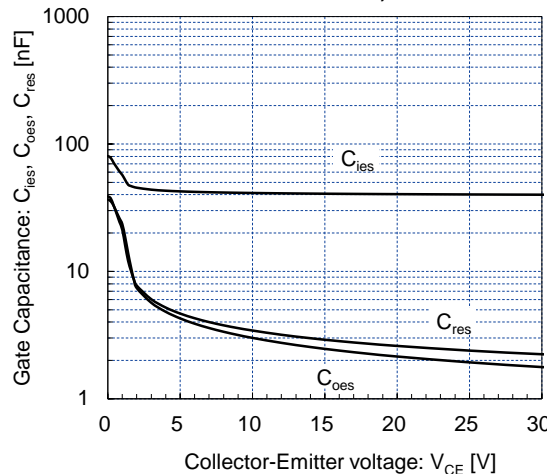
Collector current vs. Collector-Emittor voltage
 $V_{GE} = 15\text{V}$ / chip



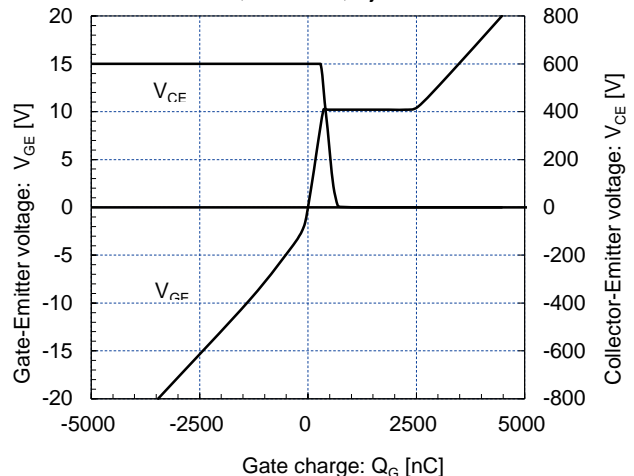
Collector-Emittor voltage vs. Gate-Emittor voltage
 $T_j = 25^\circ\text{C}$ / chip



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



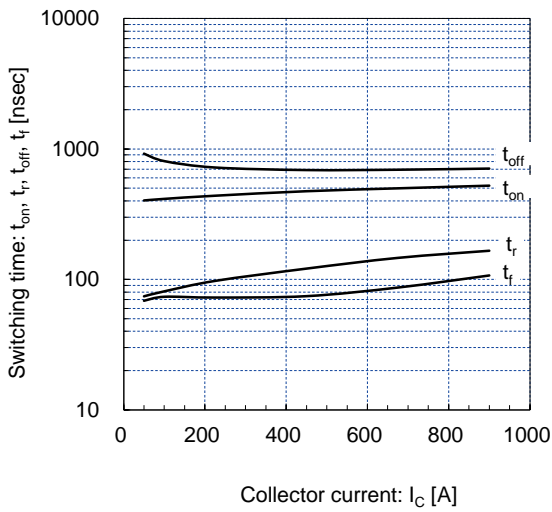
Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_c = 450\text{A}$, $T_j = 25^\circ\text{C}$



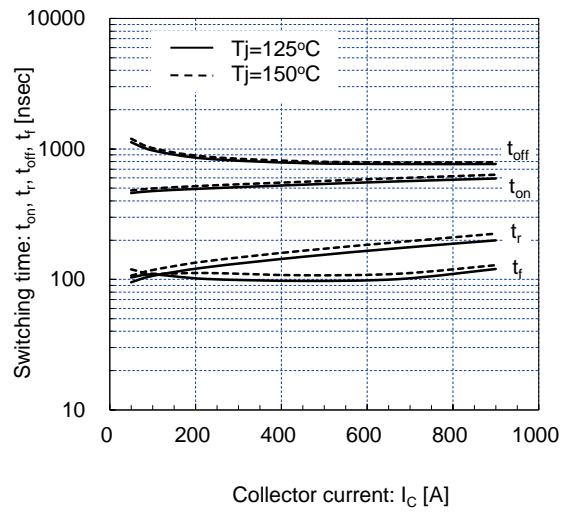
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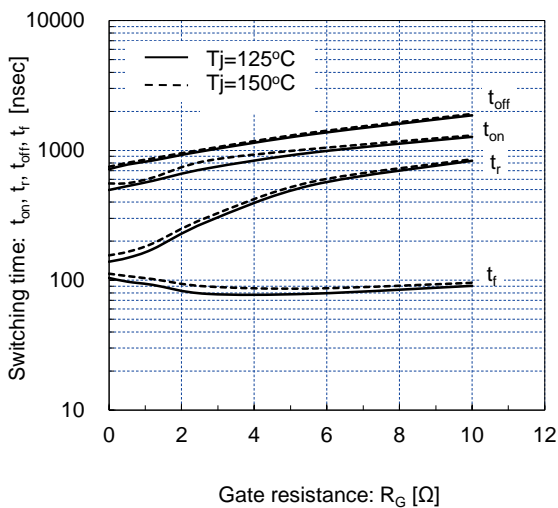
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=0.52\Omega, T_j=25^\circ C$



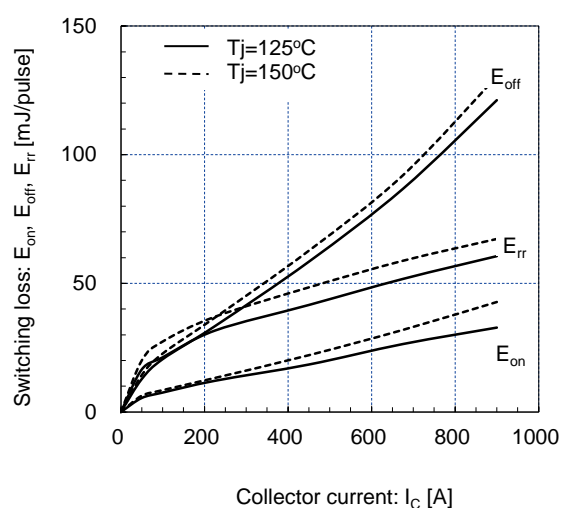
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=0.52\Omega, T_j=125^\circ C, 150^\circ C$



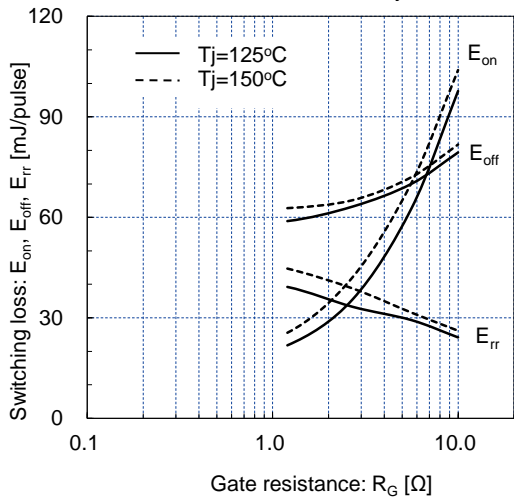
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=450A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



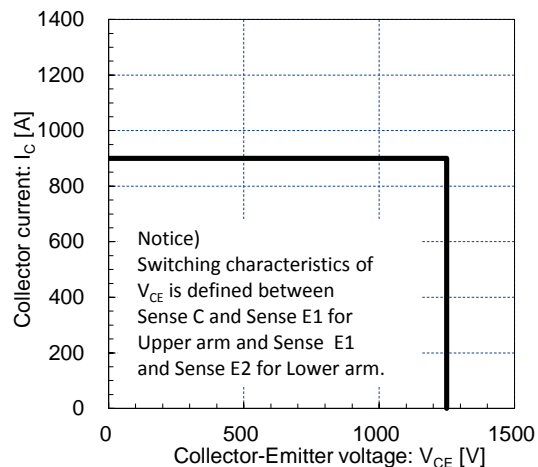
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=0.52\Omega, T_j=125^\circ C, 150^\circ C$



Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=450A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



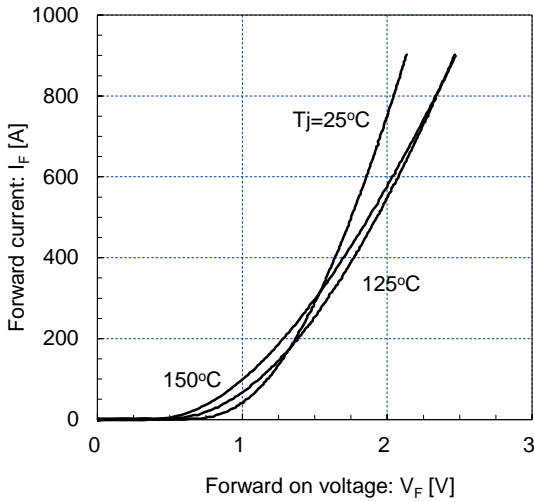
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_g=0.52\Omega, T_j=150^\circ C$



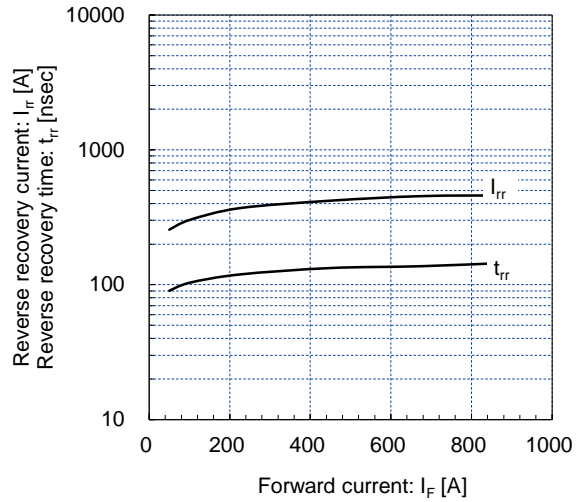
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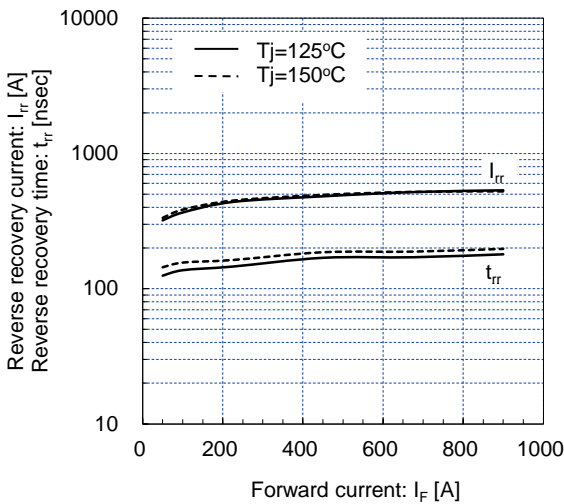
Forward current vs. Forward vltage (typ.)
chip



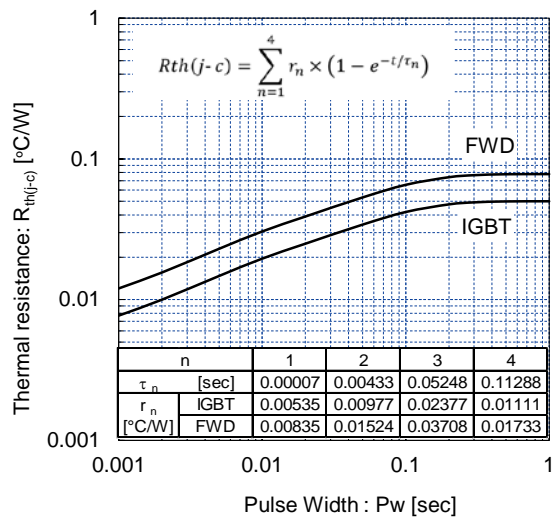
Reverse recovery characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_g=0.52\Omega$, $T_J=25^\circ\text{C}$



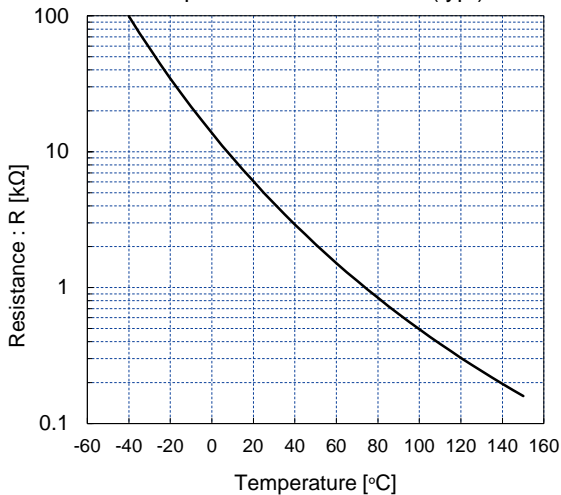
Reverse Recovery Characteristics (typ.)
 $T_J=125^\circ\text{C}, 150^\circ\text{C}$



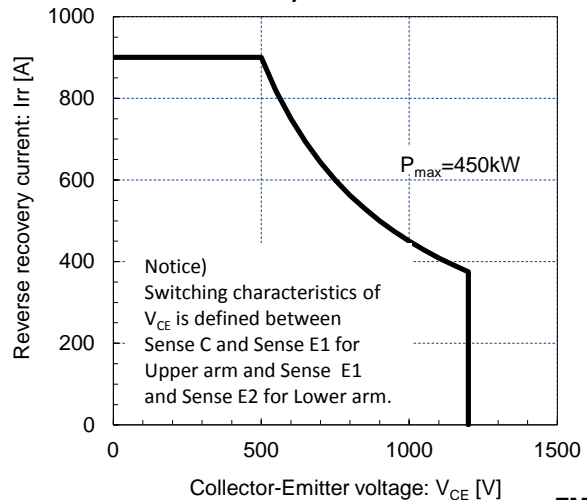
Transient Thermal Resistance (max.)



[THERMISTOR]
Temperature characteristic (typ.)



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



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