

2MBI450VH-120F-50

IGBT Modules

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

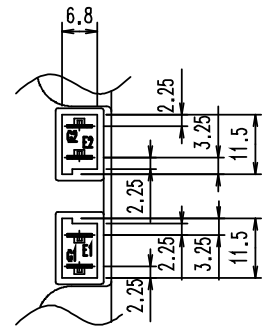
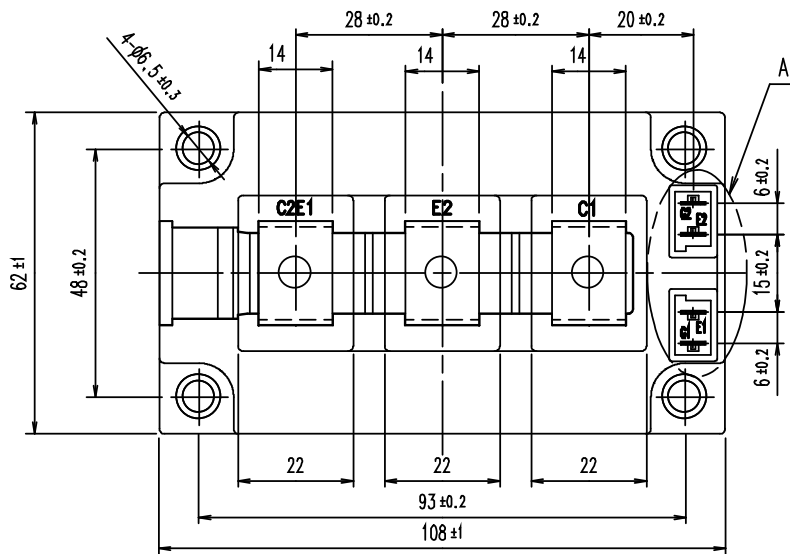
■ **Features**

- AC-switch
- High speed switching
- Voltage drive
- Low Inductance module structure

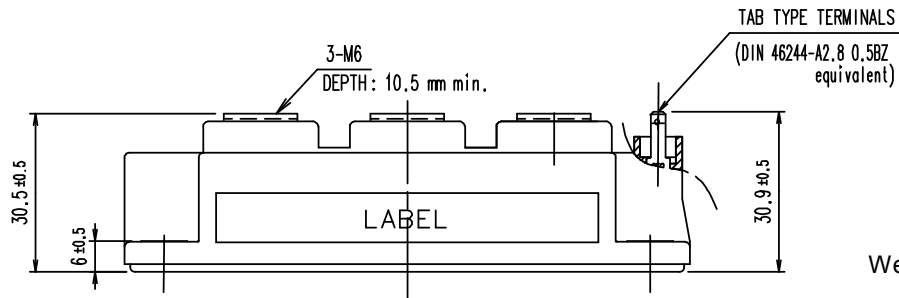
■ **Applications**

AC-switch for UPS, PCS and etc.

■ **Outline drawing (Unit : mm)**

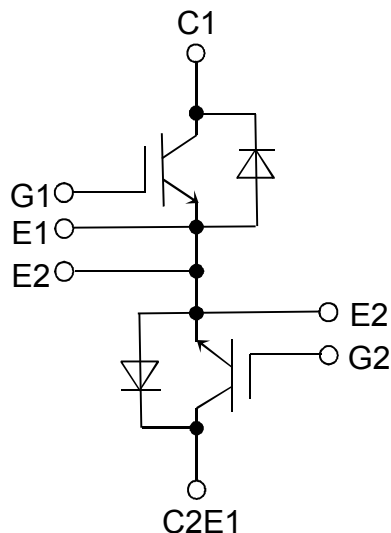


DETAIL A



Weight: 370g (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	$T_C=100^\circ\text{C}$	450	A
			$T_C=25^\circ\text{C}$	520	
	Ic pulse	1ms		900	
	$-I_C$			450	
	-Ic pulse	1ms		900	
Collector power dissipation		P_C	1 device	2400	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
Screw Torque	Mounting (*2)	-		6.0	N m
	Terminals (*3)	-		5.0	

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

(* Recommendable Value : 3.0-6.0 Nm (M5 or M6)

(* Recommendable Value : 2.5-5.0 Nm (M6)

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

The external gate resistance (R_g) shown below is one of our recommend value for the purpose of minimum switching loss. However the optimum R_g depends on circuit configuration and/or environment We recommend that the R_g has to be carefully chosen based on consideration if IGBT module matches design criteria, for example, switching loss, EMC/EMI, spike voltage, surge current and no unexpected oscillation and so on.

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage Collector current	I_{CES}	$V_{GE}=0V, V_{CE}=1200V$	-	-	2.0	mA	
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	400	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)	$V_{GE}=15V, I_c=450A$	$T_j=25^\circ\text{C}$	-	2.10	2.45	V
			$T_j=125^\circ\text{C}$	-	2.45	-	
			$T_j=150^\circ\text{C}$	-	2.50	-	
	$V_{CE(sat)}$ (chip)	$V_{GE}=15V, I_c=450A$	$T_j=25^\circ\text{C}$	-	1.80	2.15	
			$T_j=125^\circ\text{C}$	-	2.15	-	
			$T_j=150^\circ\text{C}$	-	2.20	-	
Internal gate resistance	$R_{G(int)}$	-	-	1.9	-	Ω	
Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$	-	36.4	-	nF	
Turn-on time	t_{on}	$V_{cc}=600V, I_c=450A, V_{GE}=\pm 15V, R_g=1\Omega, T_j=150^\circ\text{C}, L_s=30nH$	-	600	-	nsec	
	t_r		-	200	-		
	$t_{r(j)}$		-	50	-		
Turn-off time	t_{off}	$L_s=30nH$	-	800	-	nsec	
	t_f		-	80	-		
Forward on voltage	V_F (terminal)	$V_{GE}=0V, I_F=450A$	$T_j=25^\circ\text{C}$	-	2.00	2.45	V
			$T_j=125^\circ\text{C}$	-	2.20	-	
			$T_j=150^\circ\text{C}$	-	2.15	-	
	V_F (chip)	$V_{GE}=0V, I_F=450A$	$T_j=25^\circ\text{C}$	-	1.70	2.15	
			$T_j=125^\circ\text{C}$	-	1.90	-	
			$T_j=150^\circ\text{C}$	-	1.85	-	
Reverse recovery time	t_{rr}	$I_F=450A$	-	150	-	nsec	

■ Thermal resistance characteristics

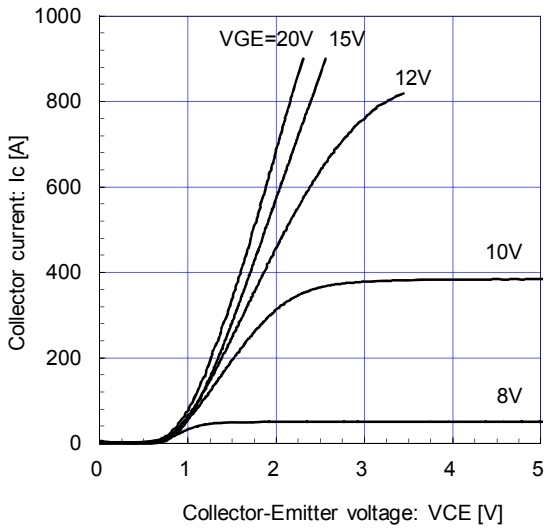
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.062	$^\circ\text{C/W}$
		FWD	-	-	0.110	
Contact thermal resistance (1device) (*1)	$R_{th(c-f)}$	with thermal compound	-	0.0125	-	

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

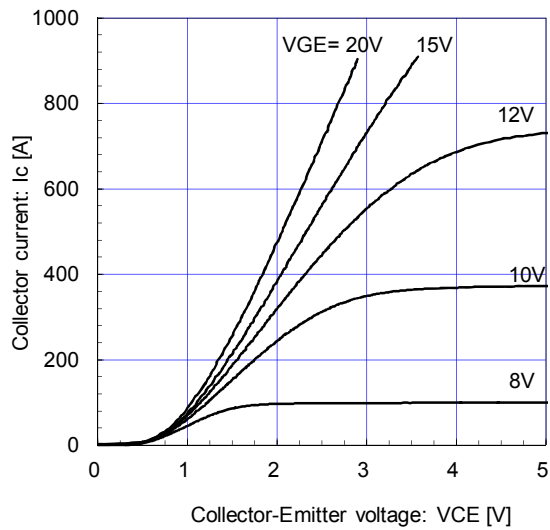
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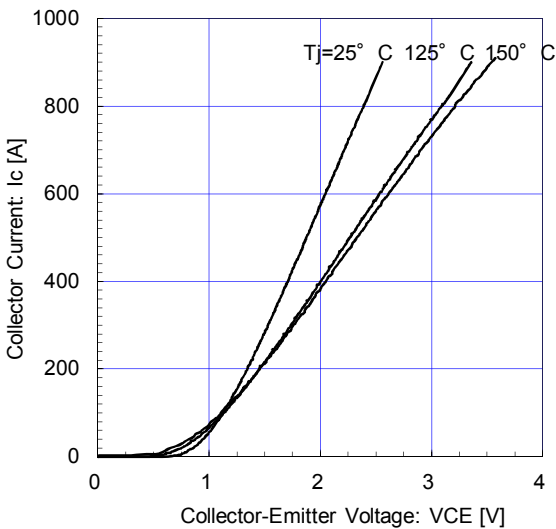
Collector current vs. Collector-Emittor voltage
T_j = 25°C / chip



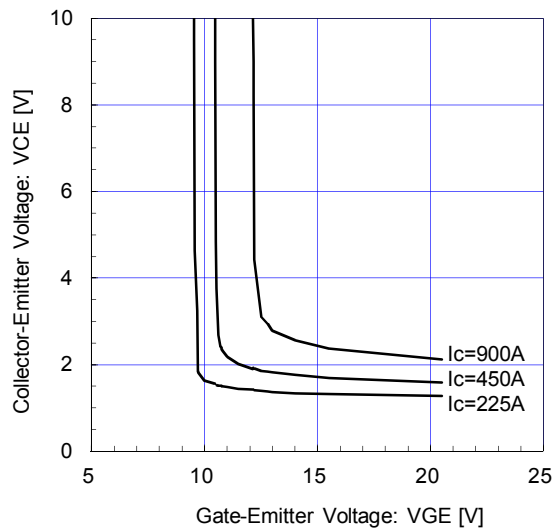
Collector current vs. Collector-Emittor voltage (typ.)
T_j = 150°C / chip



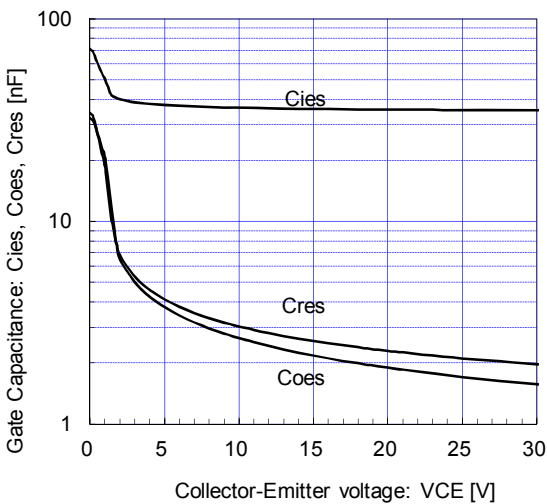
Collector current vs. Collector-Emittor voltage
VGE = 15V / chip



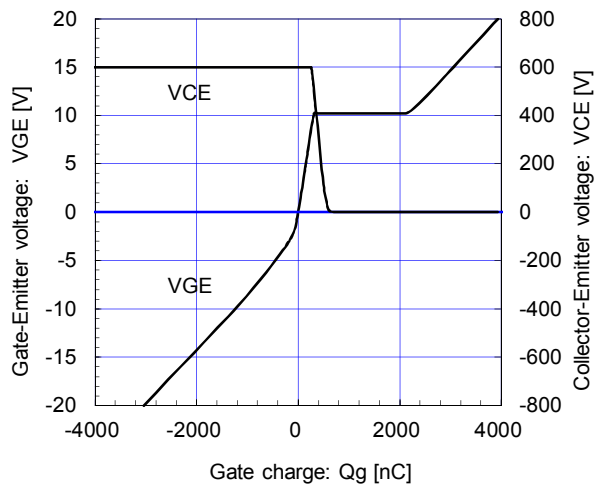
Collector-Emittor voltage vs. Gate-Emittor voltage
T_j = 25°C / chip



Gate Capacitance vs. Collector-Emittor
VGE = 0V, f = 1MHz, T_j = 25°C



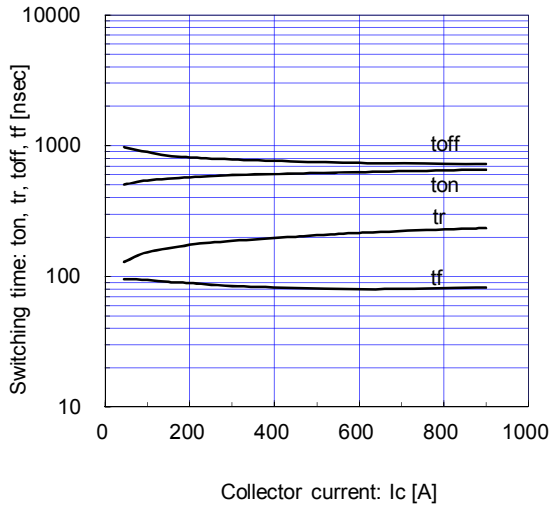
Dynamic Gate Charge (typ.)
V_{cc} = 600V, I_c = 450A, T_j = 25°C



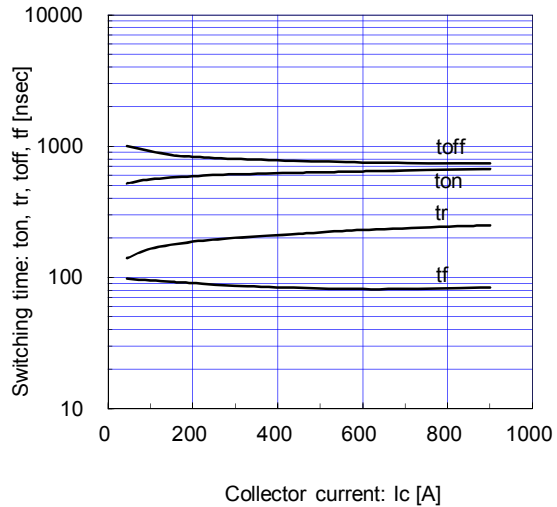
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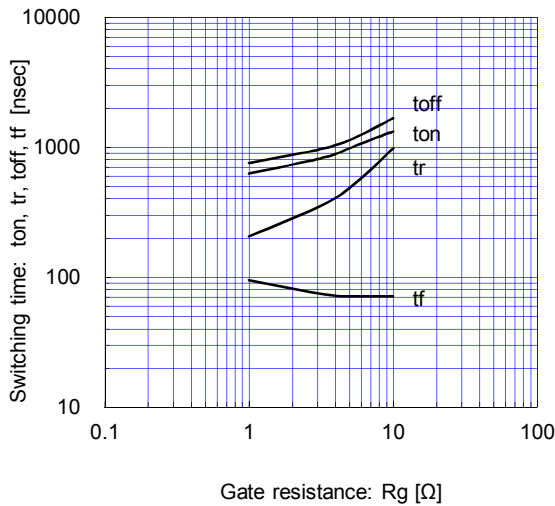
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1\Omega, T_j=125^\circ C$



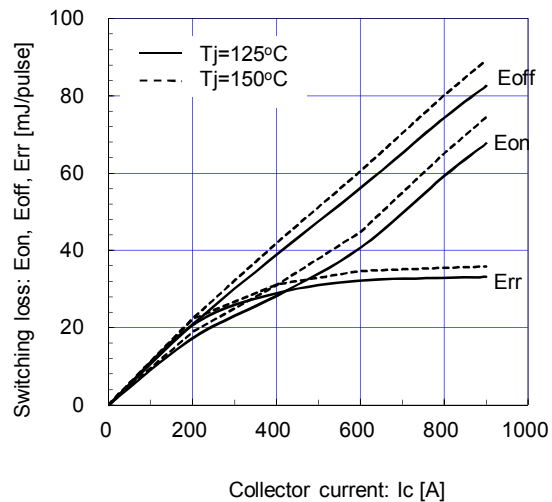
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1\Omega, T_j=150^\circ C$



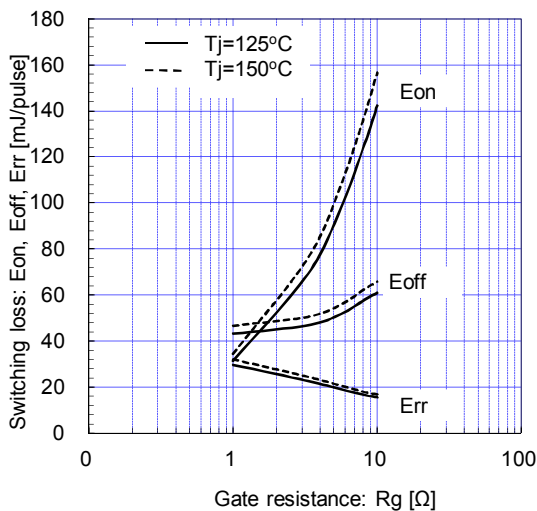
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=450A, V_{GE}=\pm 15V, T_j=125^\circ C$



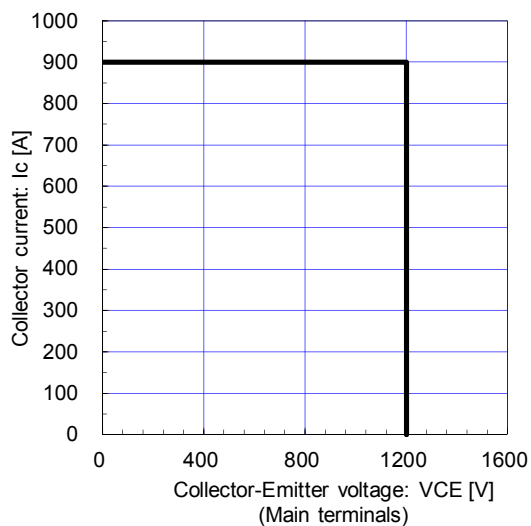
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1\Omega, T_j=125, 150^\circ C$



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



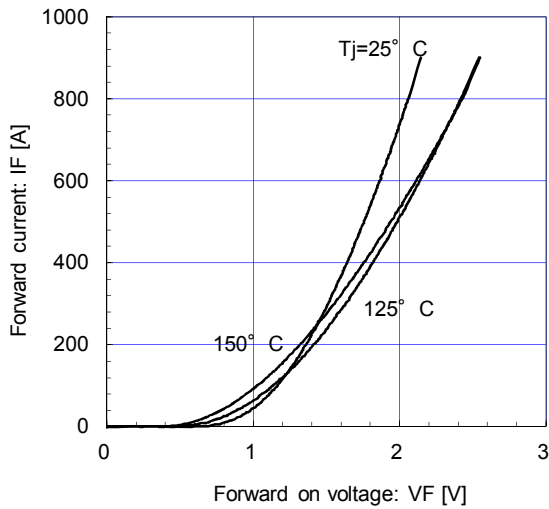
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_g=1\Omega, T_j=150^\circ C$



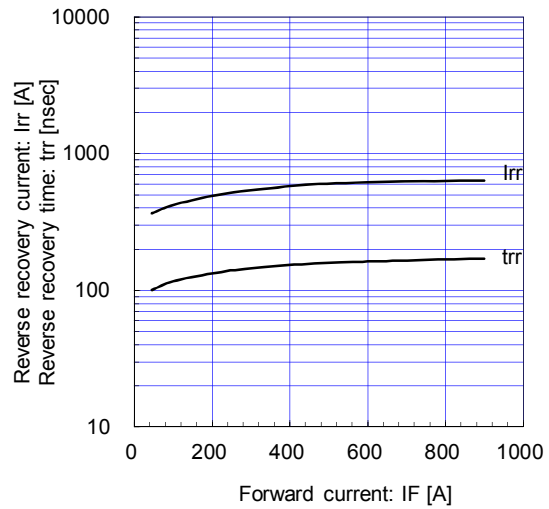
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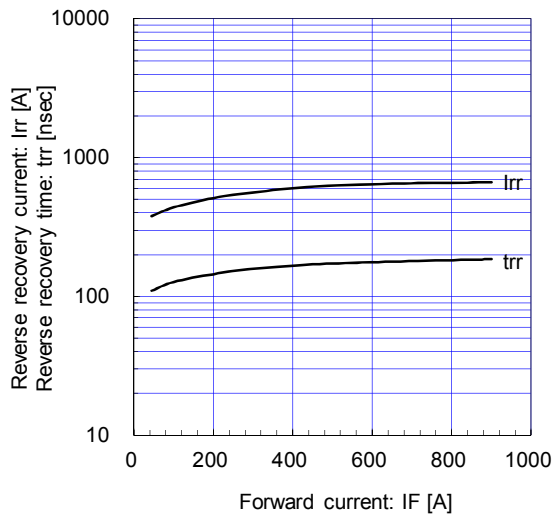
Forward Current vs. Forward Voltage (typ.)
chip



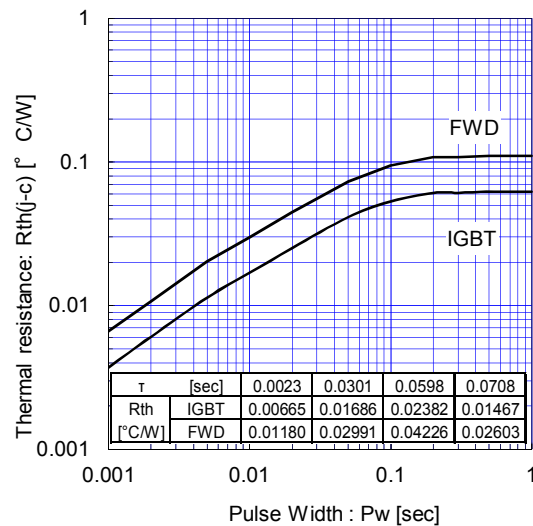
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=1Ω, Tj=125°C



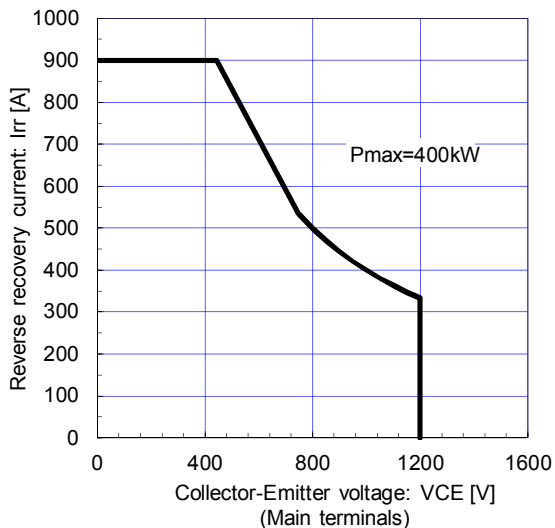
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=1Ω, Tj=150°C



Transient Thermal Resistance (max.)



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



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