

2MBI300VH-170-50

IGBT Modules

Power Module (V series)
1700V / 300A / 2-in-1 package

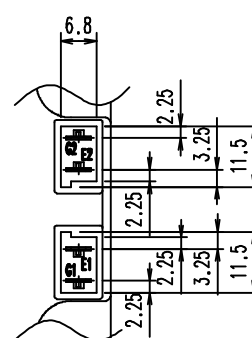
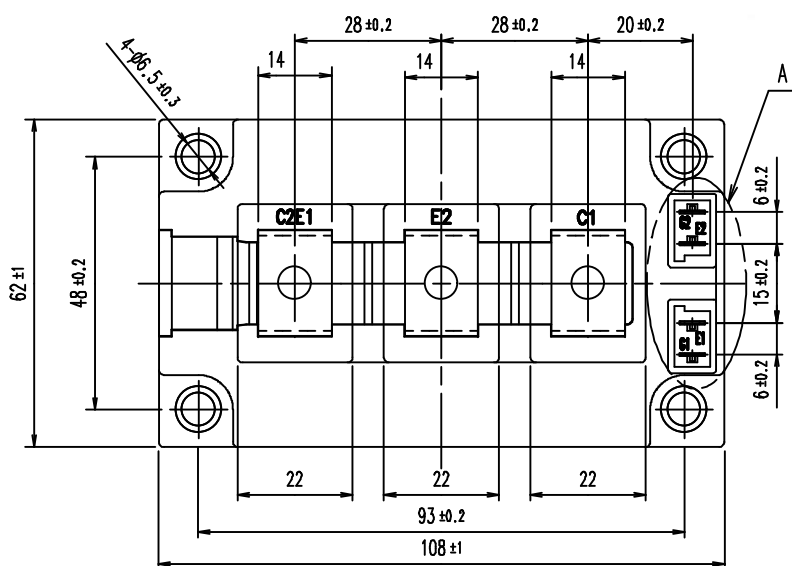
■ Features

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

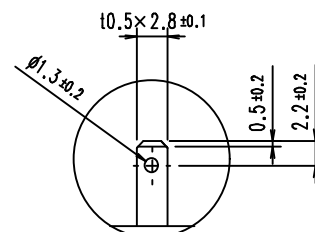
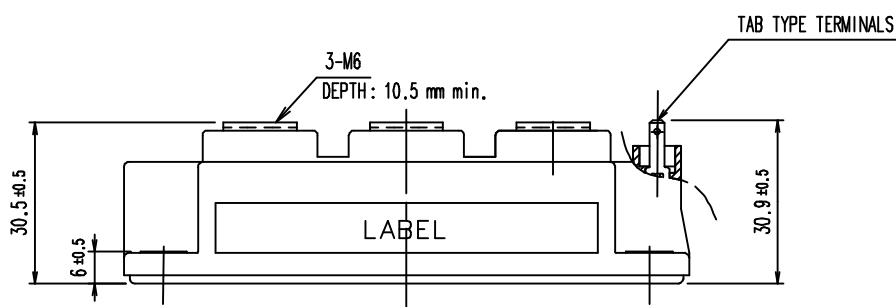
■ Applications

AC-switch for UPS, PCS and etc.

■ Outline drawing (Unit : mm)



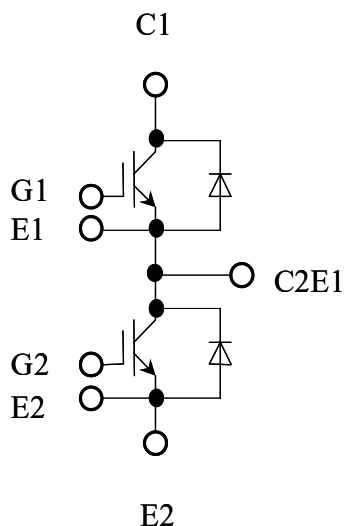
DETAIL A



DETAIL TAB TYPE TERMINALS

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}		1700	V
Gate-Emitter voltage		V_{GES}		± 20	V
Collector current		I_C	Continuous	$T_C = 100^\circ\text{C}$ $T_C = 25^\circ\text{C}$	300 440
		I_C pulse	1ms		600
		$-I_C$			300
		$-I_C$ pulse	1ms		600
Collector power dissipation		P_C	1 device		1805
Junction temperature		T_J			175
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.		4000
Screw torque	Mounting	-	M5 or M6		3.0~6.0
	Terminals	-	M6		2.5~5.0

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

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

NOTICE:

The external gate resistance (R_{g_on} , R_{g_off}) shown in 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. Especially, we recommend to choose R_{g_on} value shown in below or more. Otherwise it might be exceeded the FWD safe operating area.

Items	Symbols	Conditions		Characteristics			Units
				min.	typ.	max.	
Zero gate voltage Collector current	I_{CES}	$V_{GE}=0V, V_{CE}=1700V$		-	-	2.0	mA
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$		-	-	400	nA
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=20V, I_C=300mA$		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE}=15V, I_C=300A$	$T_j=25^{\circ}C$	-	2.15	2.60	V
			$T_j=125^{\circ}C$	-	2.55	-	
			$T_j=150^{\circ}C$	-	2.60	-	
	$V_{CE(sat)}$ (chip)	$V_{GE}=15V, I_C=300A$	$T_j=25^{\circ}C$	-	2.00	2.45	
			$T_j=125^{\circ}C$	-	2.40	-	
			$T_j=150^{\circ}C$	-	2.45	-	
Internal gate resistance	$R_{g(int)}$	-		-	2.5	-	Ω
Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$		-	33	-	nF
Turn-on time	t_{on}	$V_{CC}=900V, I_C=300A, V_{GE}=\pm 15V, R_{g_on}=4.7\Omega, R_{g_off}=2.4\Omega$		-	1150	-	nsec
	t_r			-	580	-	
	$t_{r(i)}$			-	60	-	
Turn-off time	t_{off}	$T_j=150^{\circ}C, L_s=30nH$		-	1050	-	nsec
	t_f			-	140	-	
Forward on voltage	V_F (terminal)	$V_{GE}=0V, I_F=300A$	$T_j=25^{\circ}C$	-	1.95	2.40	V
			$T_j=125^{\circ}C$	-	2.15	-	
			$T_j=150^{\circ}C$	-	2.15	-	
	V_F (chip)	$V_{GE}=0V, I_F=300A$	$T_j=25^{\circ}C$	-	1.80	2.25	
			$T_j=125^{\circ}C$	-	2.05	-	
			$T_j=150^{\circ}C$	-	2.05	-	
Reverse recovery time	t_{rr}	$I_F=300A$		-	220	-	nsec

■ Thermal resistance characteristics

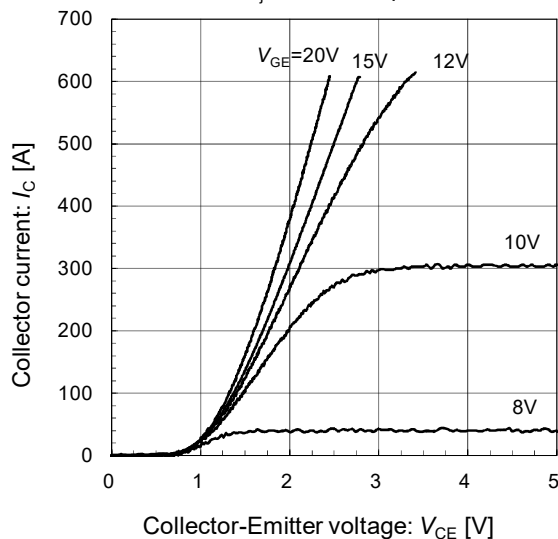
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	-	$^\circ\text{C/W}$
		FWD	-	-	0.130	
Contact thermal resistance (1device) (*1)	$R_{th(c-f)}$	with thermal compound	-	0.0125	-	

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

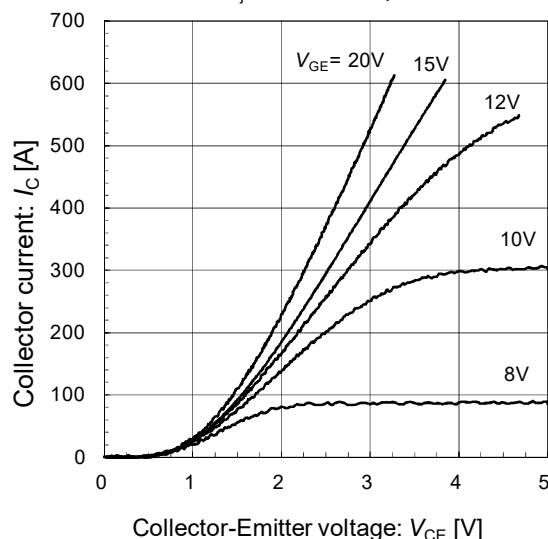
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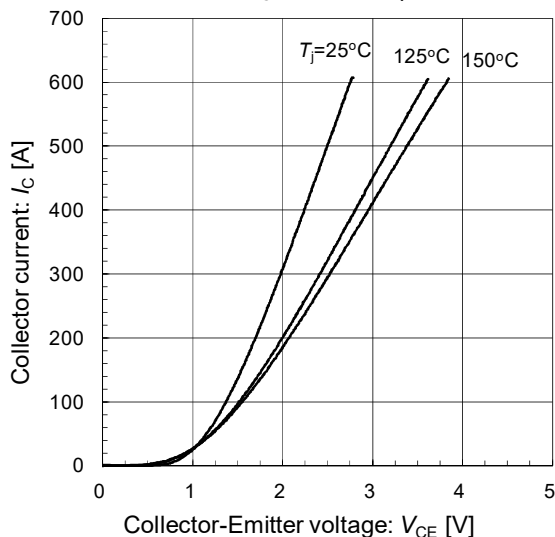
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



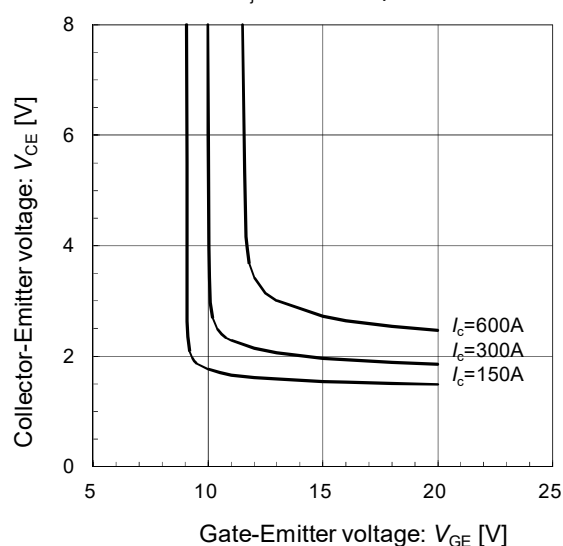
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



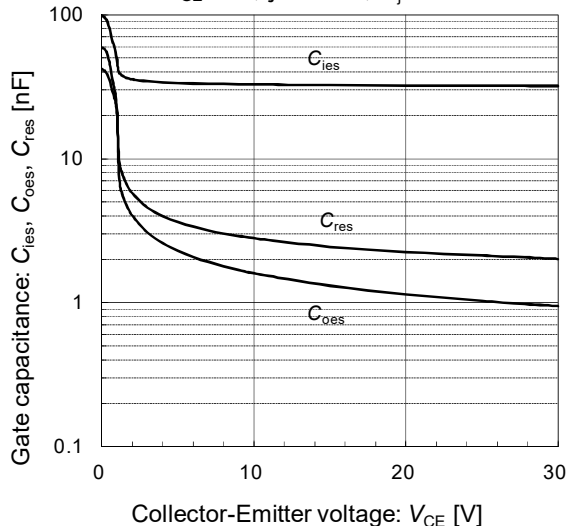
Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



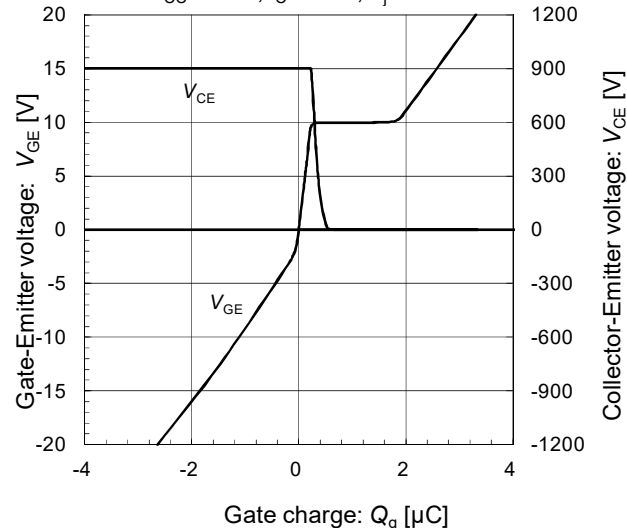
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



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.)
 $V_{CC} = 900\text{V}$, $I_C = 300\text{A}$, $T_j = 25^\circ\text{C}$

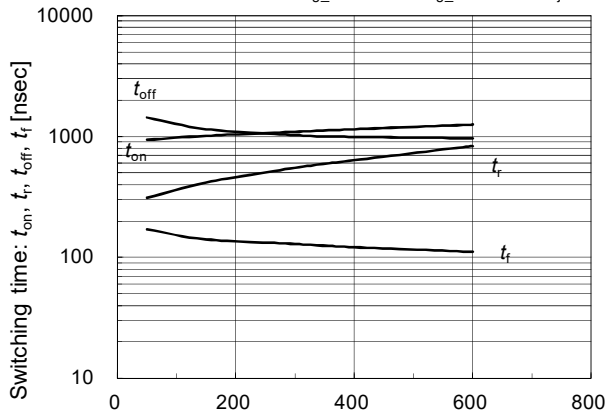


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Switching time vs. Collector current (typ.)

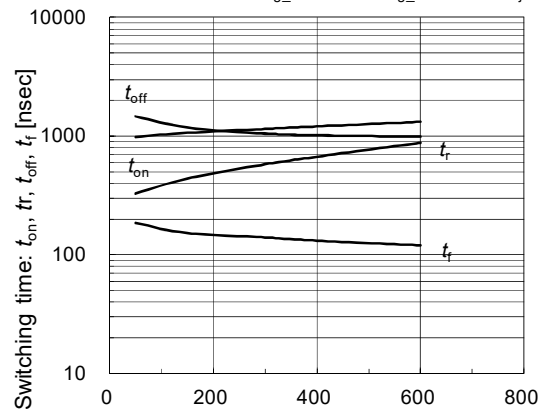
$V_{CC}=900V, V_{GE}=\pm 15V, R_{g_on}=4.7\Omega, R_{g_off}=2.4\Omega, T_j=125^\circ C$



Collector current: I_c [A]

Switching time vs. Collector current (typ.)

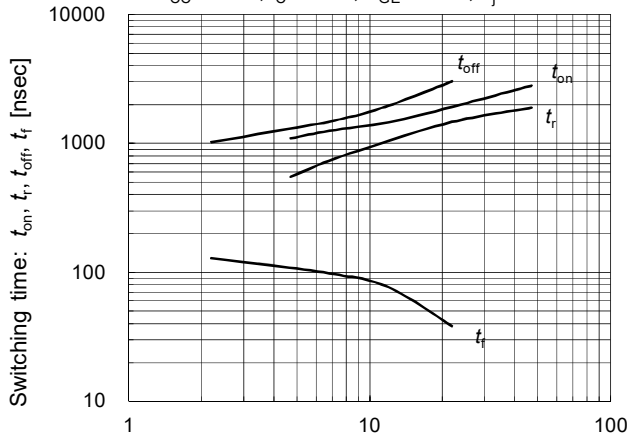
$V_{CC}=900V, V_{GE}=\pm 15V, R_{g_on}=4.7\Omega, R_{g_off}=2.4\Omega, T_j=150^\circ C$



Collector current: I_c [A]

Switching time vs. Gate resistance (typ.)

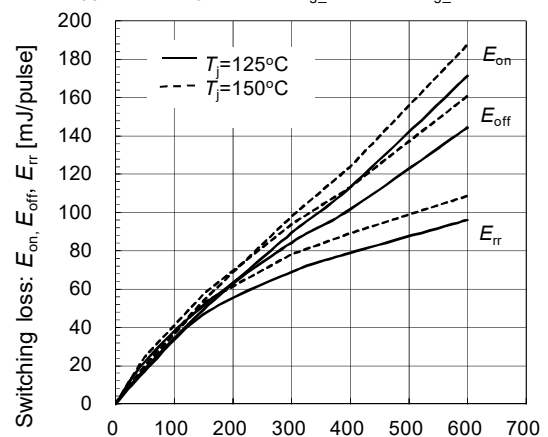
$V_{CC}=900V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C$



Gate resistance: R_g [Ω]

Switching loss vs. Collector current (typ.)

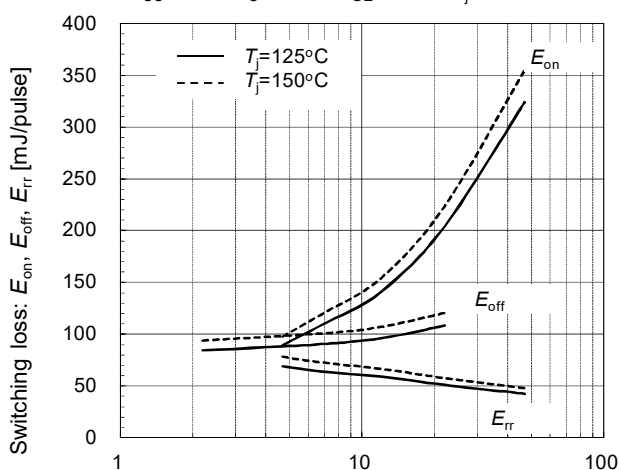
$V_{CC}=900V, V_{GE}=\pm 15V, R_{g_on}=4.7\Omega, R_{g_off}=2.4\Omega$



Collector current: I_c [A]

Switching loss vs. Gate resistance (typ.)

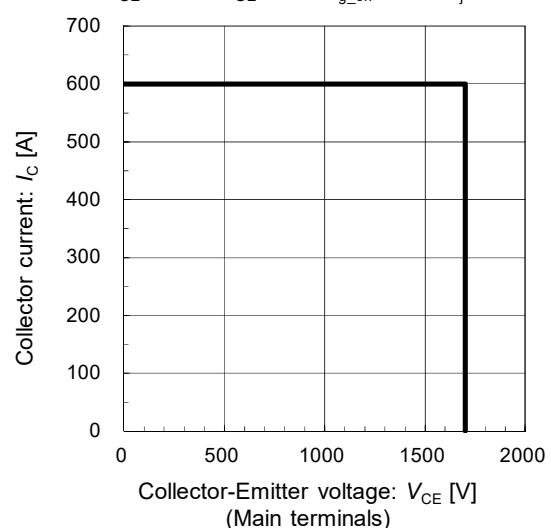
$V_{CC}=900V, I_c=300A, V_{GE}=\pm 15V, T_j=125, 150^\circ C$



Gate resistance: R_{g_on}, R_{g_off} [Ω]

Reverse bias safe operating area (max.)

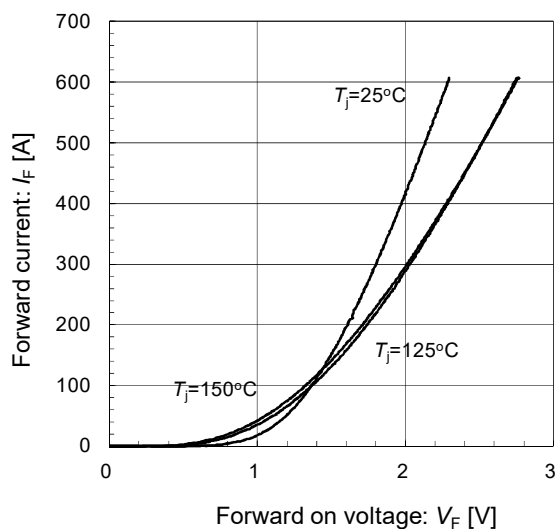
$+V_{GE}=15V, -V_{GE}=15V, R_{g_off}=2.4\Omega, T_j=150^\circ C$



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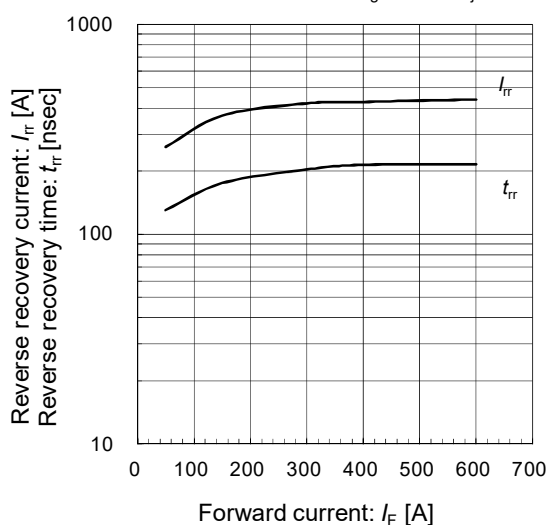
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Forward current vs. Forward voltage (typ.)
chip



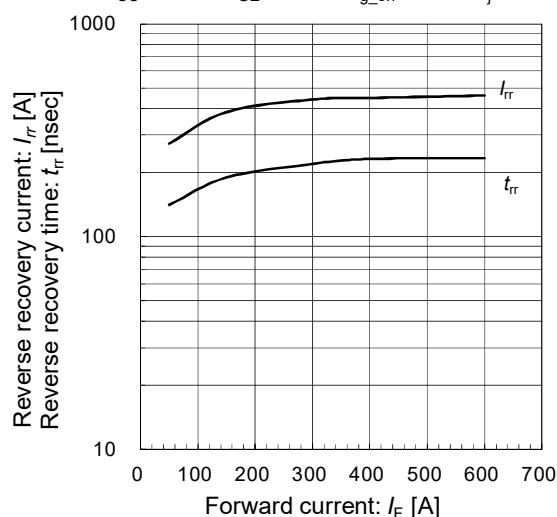
Reverse recovery characteristics (typ.)

$V_{CC}=900V, V_{GE}=\pm 15V, R_g=4.7\Omega, T_j=125^\circ C$

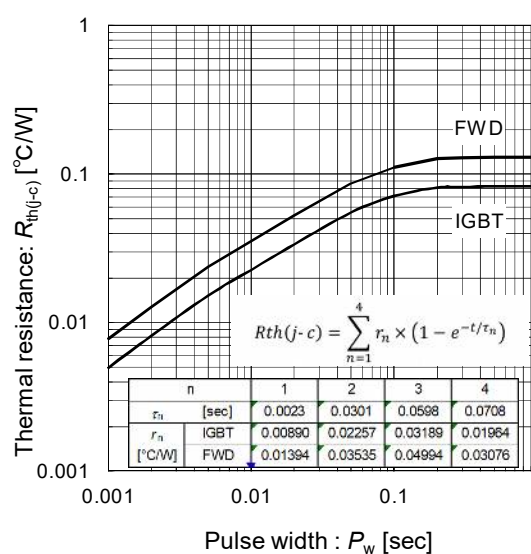


Reverse recovery characteristics (typ.)

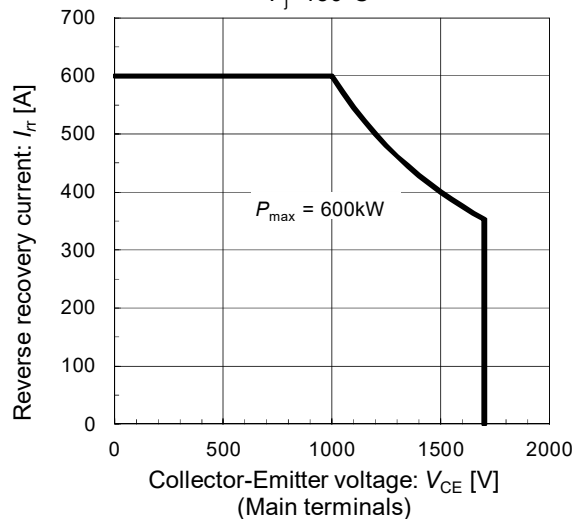
$V_{CC}=900V, V_{GE}=\pm 15V, R_{g_on}=4.7\Omega, T_j=150^\circ C$



Transient thermal resistance (max.)



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



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