

1MBI1400VXB-170PH-50

IGBT Modules

IGBT Module (V series)
1700V / 1400A / 1 in one package

■ Features

Low $V_{CE(sat)}$
 Low Inductance Module structure

■ Applications

Inverter for Motor Drives, AC and DC Servo Drives
 Uninterruptible Power Supply Systems
 Industrial machines, such as Welding machines



■ Maximum Rating and Characteristics

● 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 for IGBT and Inverse Diode	I_C	Continuous	$T_C = 25^\circ\text{C}$ 1800 $T_C = 100^\circ\text{C}$ 1400	A
	I_C pulse	1ms	2800	
	$-I_C$		1400	
	$-I_C$ pulse	1ms	2800	
Collector power dissipation	P_C	1 device	8820	W
Reverse voltage for FWD	V_R		1700	V
Forward current for FWD	I_F	Continuous	1400	A
	I_F pulse	1ms	2800	
Junction temperature	T_j		175	$^\circ\text{C}$
Operating junction temperature (under switching condition)	T_{jop}		150	
Case temperature	T_C		150	
Storage temperature	T_{stg}		-40 ~ +150	
Isolation voltage	between terminal and copper base *1	V_{iso}	AC: 1min.	VAC
	between thermistor and others *2			
Screw	Mounting	-	M5	N·m
Torque	Main Terminals	-	M8	
	Sense Terminals	-	M4	

Note*1: All terminals should be connected together during the test.

Note*2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note*3: Recommendable Value: Mounting 3.0 ~ 6.0 N·m (M5)
 Recommendable Value: Main terminals 8.0 ~ 10.0 N·m (M8)
 Recommendable Value: Sense terminals 1.8 ~ 2.1 N·m (M4)

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

Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
IGBT/Inverter Diode	Zero gate voltage Collector current	I _{CES}	V _{GE} =0V V _{CE} =1700V		-	-	12	mA
	Gate-Emitter leakage current	I _{GES}	V _{CE} =0V V _{GE} =±20V		-	-	2400	nA
	Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} =20V I _C =1400mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} =15V I _C =1400A	T _J =25°C	-	2.10	2.55	V
				T _J =125°C	-	2.45	-	
				T _J =150°C	-	2.55	-	
		V _{CE(sat)} (chip)		T _J =25°C	-	1.90	2.35	
				T _J =125°C	-	2.25	-	
				T _J =150°C	-	2.35	-	
	Internal gate resistance	R _{g(int)}	-		-	2.25	-	Ω
	Input capacitance	C _{ies}	V _{CE} =10V, V _{GE} =0V, f=1MHz		-	113	-	nF
	Turn-on Time	t _{on}	V _{CC} = 900V I _C = 1400A V _{GE} = ±15V		-	1350	-	nsec
		t _r			-	300	-	
		t _{r(l)}			-	150	-	
	Turn-off Time	t _{off}	R _G = +0.47/-0.68Ω L _S =60nH		-	1800	-	nsec
		t _f			-	200	-	
	Forward on voltage	V _F (terminal) *4	V _{GE} =0V I _F = 1400A	T _J =25°C	-	2.00	2.45	V
T _J =125°C				-	2.25	-		
T _J =150°C				-	2.20	-		
V _F (chip)		T _J =25°C		-	1.80	2.25		
		T _J =125°C		-	2.05	-		
		T _J =150°C		-	2.00	-		
Reverse recovery time	t _{rr}	I _F =1400A		-	250	-	nsec	
Reverse recovery time	I _R	V _{CE} =1700V		-	-	3.0	mA	
FWD	Forward on voltage	V _F (terminal) *4	V _{GE} =0V I _F = 1400A	T _J =25°C	-	2.00	2.45	V
				T _J =125°C	-	2.25	-	
				T _J =150°C	-	2.20	-	
		V _F (chip)		T _J =25°C	-	1.80	2.25	
				T _J =125°C	-	2.05	-	
				T _J =150°C	-	2.00	-	
	Reverse recovery time	t _{rr}	I _F =1400A		-	250	-	nsec
Thermistor	Resistance	R	T=25°C T=100°C		- 465	5000 495	- 520	Ω
	B value	B	T=25/50°C		3305	3375	3450	K

Note*4

Fuji defined V_{CE} value of terminal by using Sense C1 and Sense C2E1 for Upper arm and Sense C2E1 and Sense E2

■ Thermal resistance characteristics

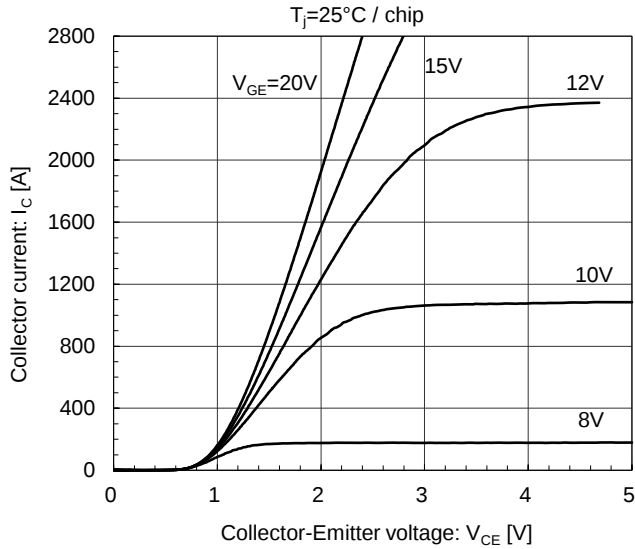
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.017	$^\circ\text{C/W}$
		Inverse Diode	-	-	0.032	
		Inverter FWD	-	-	0.032	
Contact thermal resistance (1device) *5	$R_{th(c-f)}$	with Thermal Compound	-	0.0420	-	

Note*5 This is the value which is defined mounting on the additional heatsink with thermal compound

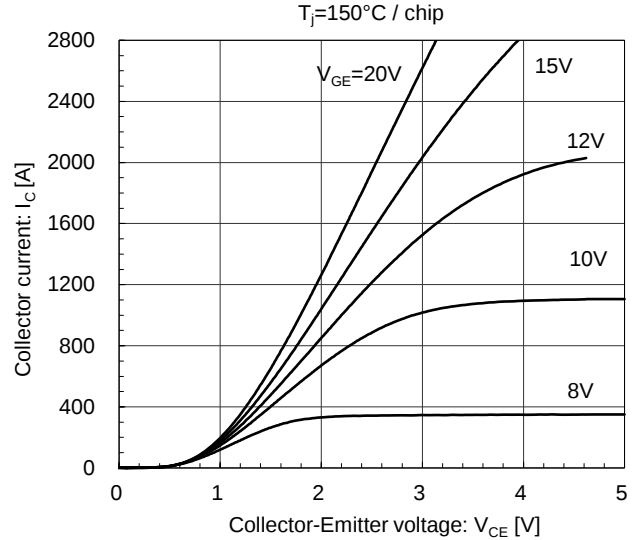
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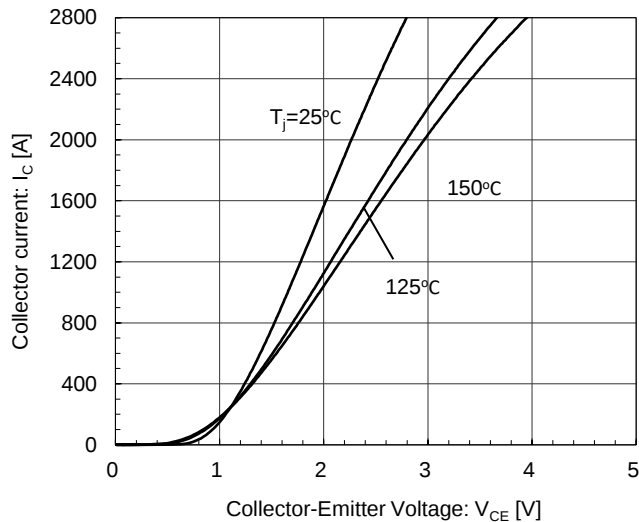
Collector current vs. Collector-Emitter voltage (typ.)



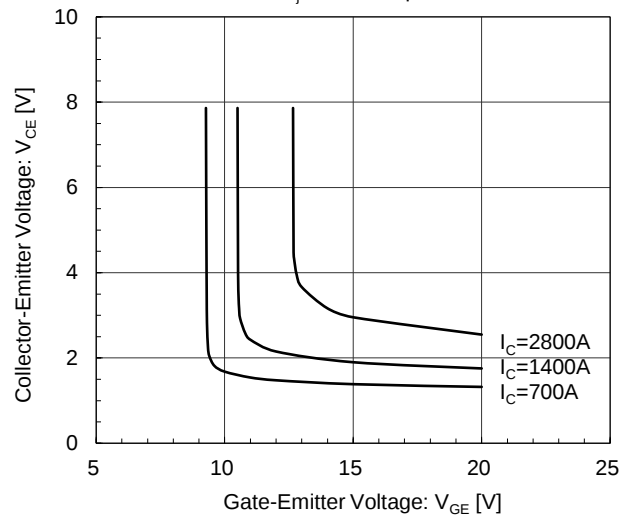
Collector current vs. Collector-Emitter voltage (typ.)



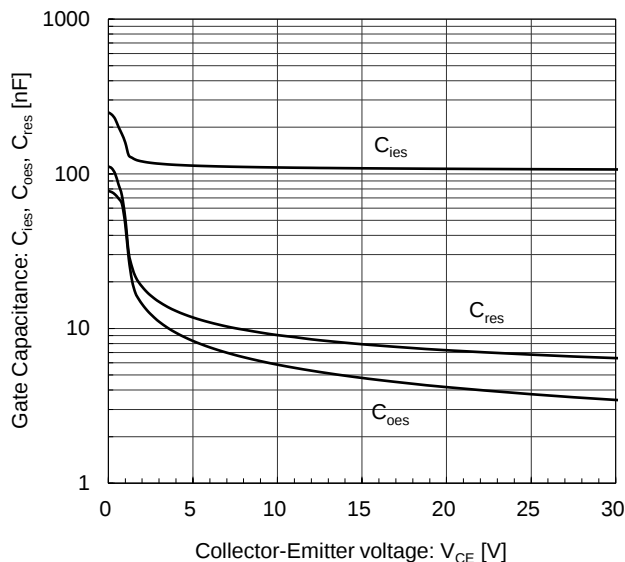
Collector current vs. Collector-Emitter voltage
 $V_{GE} = 15\text{ V} / \text{chip}$



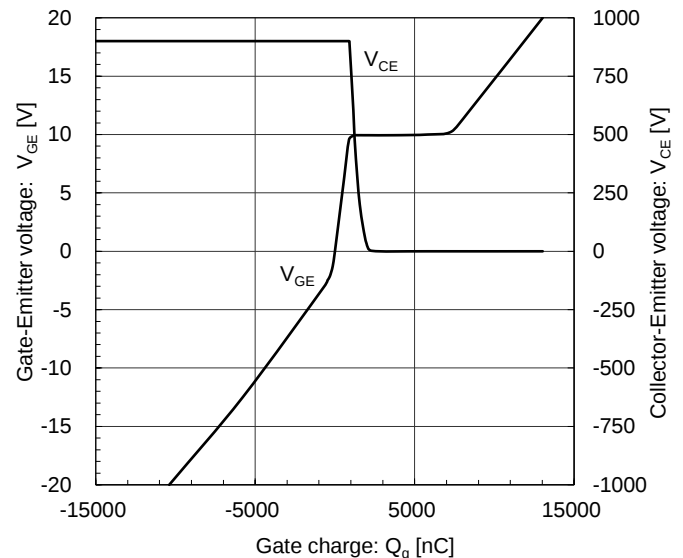
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_J = 25^\circ\text{C} / \text{chip}$



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.)
 $V_{CC} = 900\text{V}, I_C = 1400\text{A}, T_J = 25^\circ\text{C}$

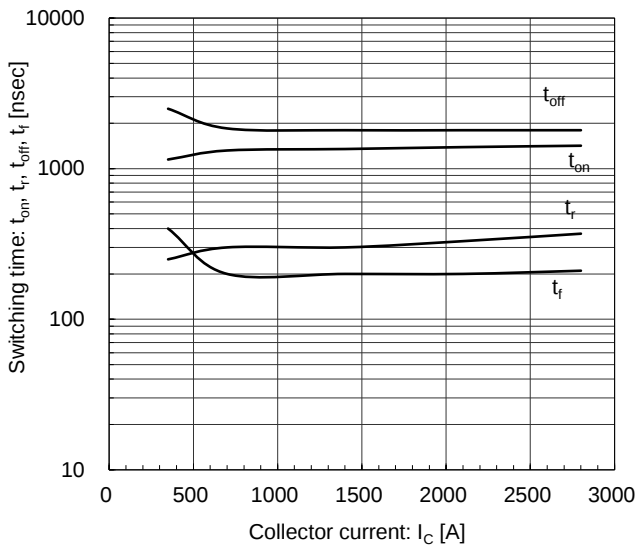


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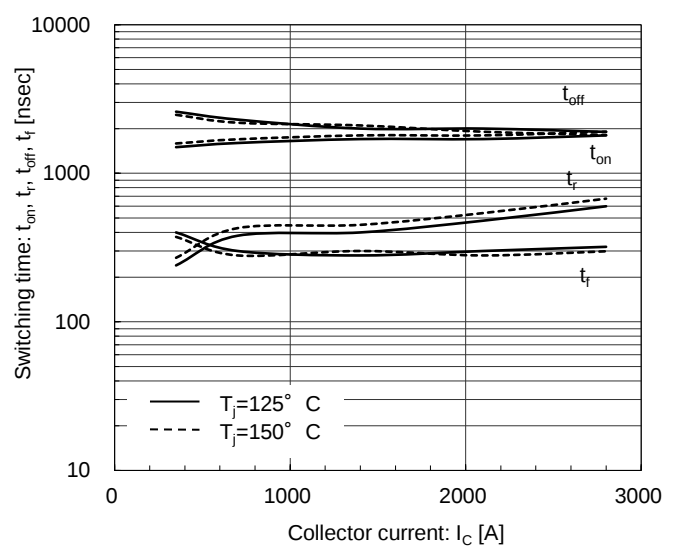
Switching time vs. Collector current (typ.)

$V_{CC}=900V$, $V_{GE}=\pm 15V$, $R_G=+0.47/-0.68\Omega$, $T_J=25^\circ C$



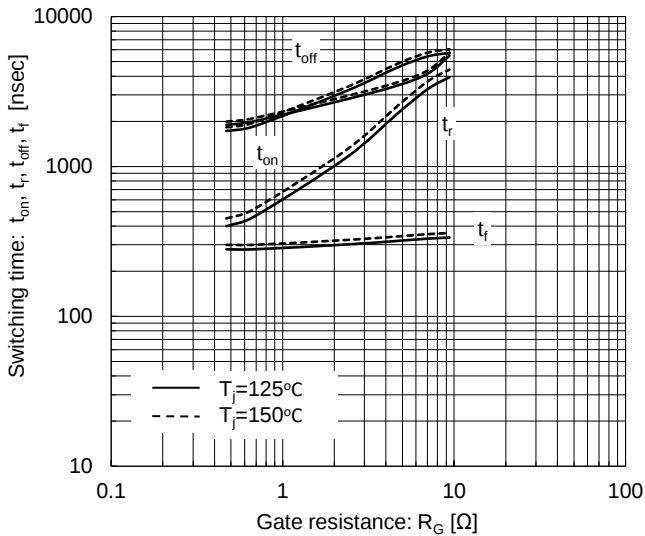
Switching time vs. Collector current (typ.)

$V_{CC}=900V$, $V_{GE}=\pm 15V$, $R_G=+0.47/-0.68\Omega$, $T_J=125^\circ C, 150^\circ C$



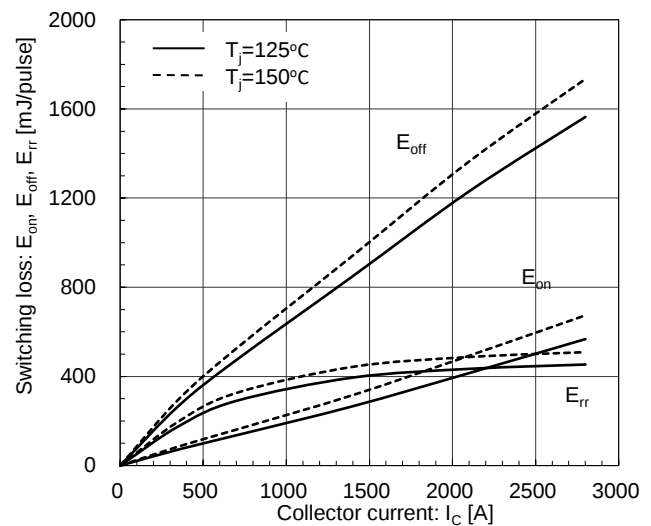
Switching time vs. Gate resistance (typ.)

$V_{CC}=900V$, $I_C=1400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$



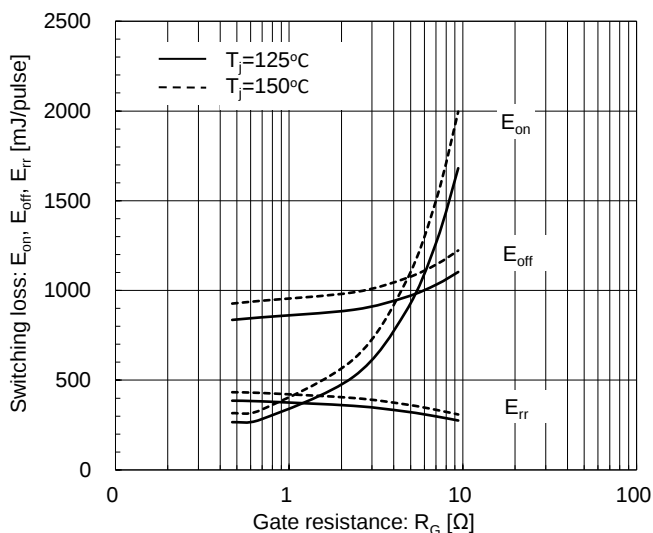
Switching loss vs. Collector current (typ.)

$V_{CC}=900V$, $V_{GE}=\pm 15V$, $R_G=+0.47/-0.68\Omega$, $T_J=125^\circ C, 150^\circ C$



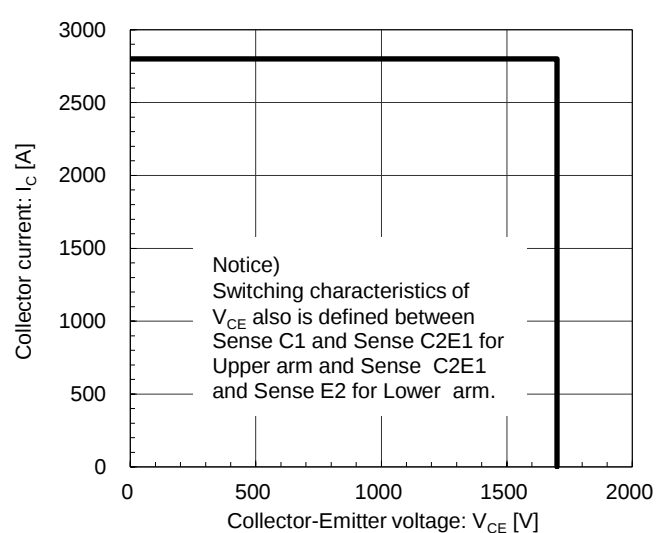
Switching loss vs. Gate resistance (typ.)

$V_{CC}=900V$, $I_C=1400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$



Reverse bias safe operating area (max.)

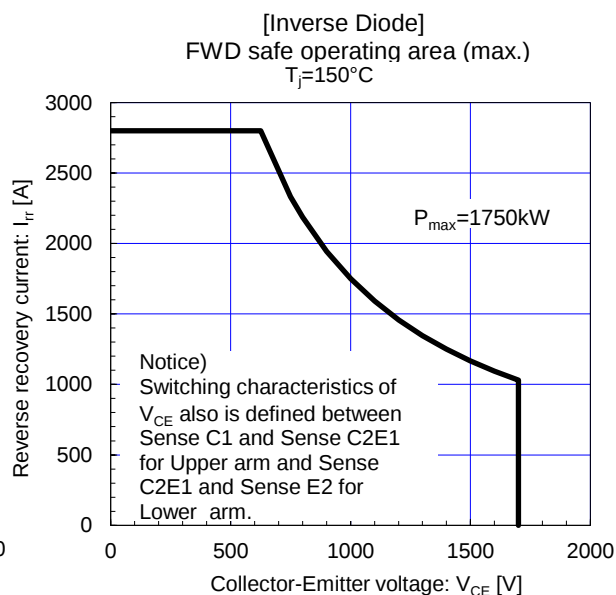
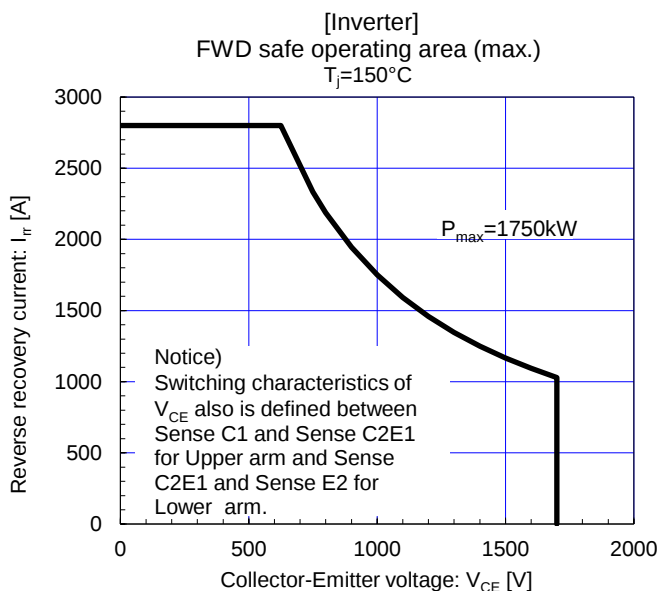
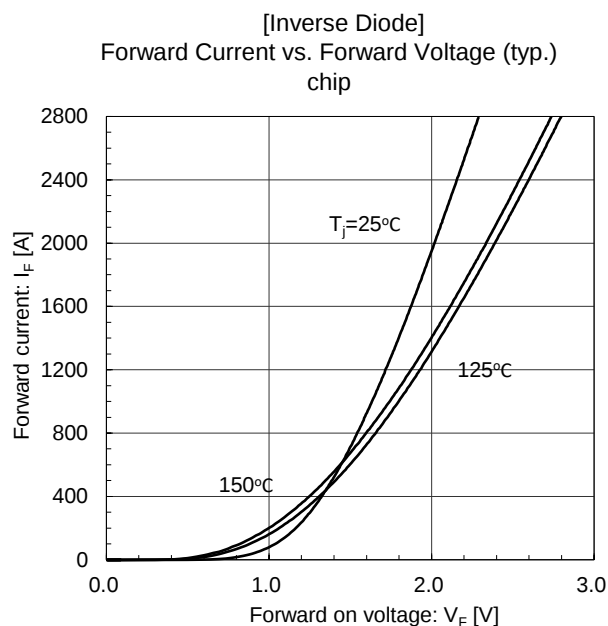
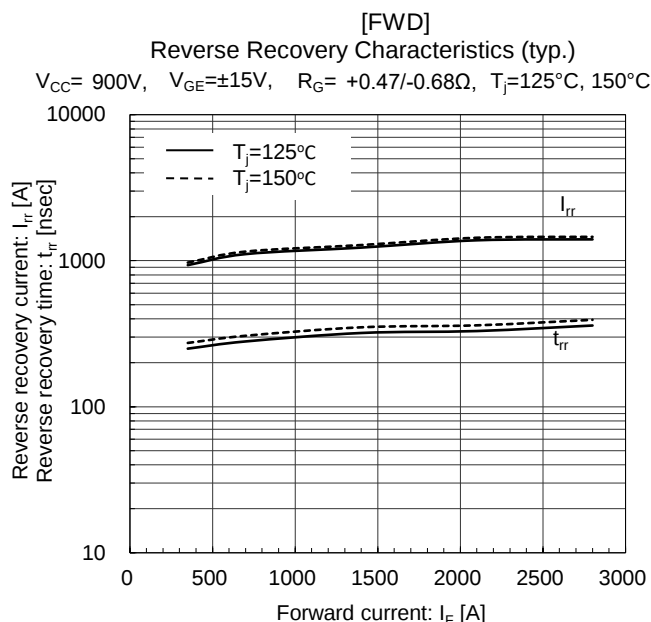
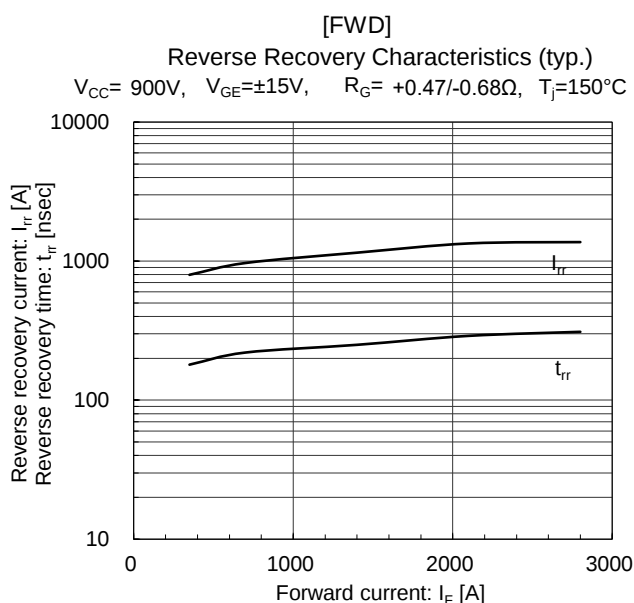
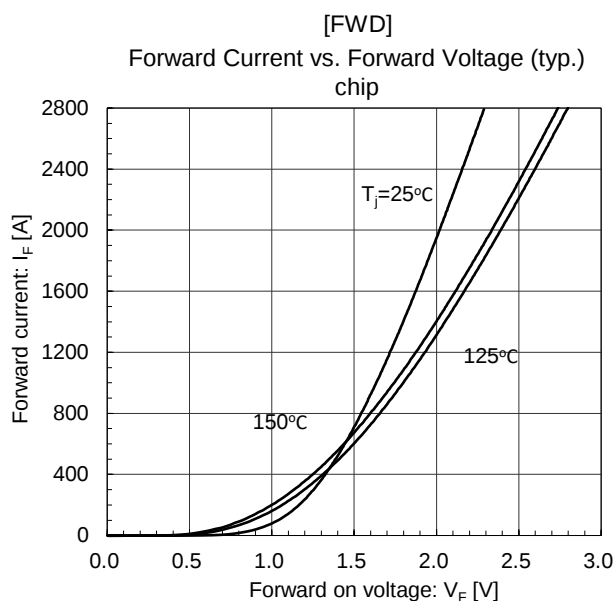
$+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=+0.47/-0.68\Omega$, $T_J=150^\circ C$



Notice)
Switching characteristics of
V_{CE} also is defined between
Sense C1 and Sense C2E1 for
Upper arm and Sense C2E1
and Sense E2 for Lower arm.

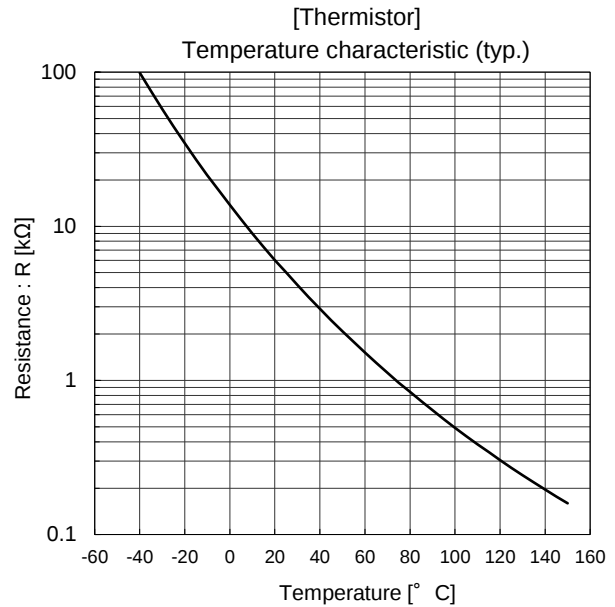
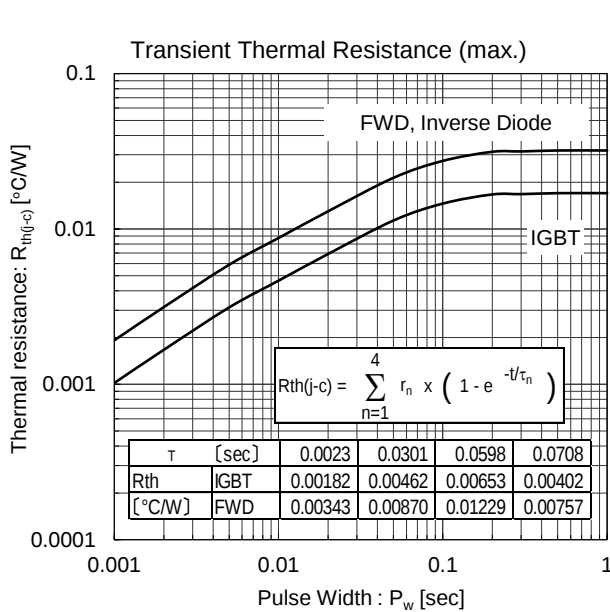
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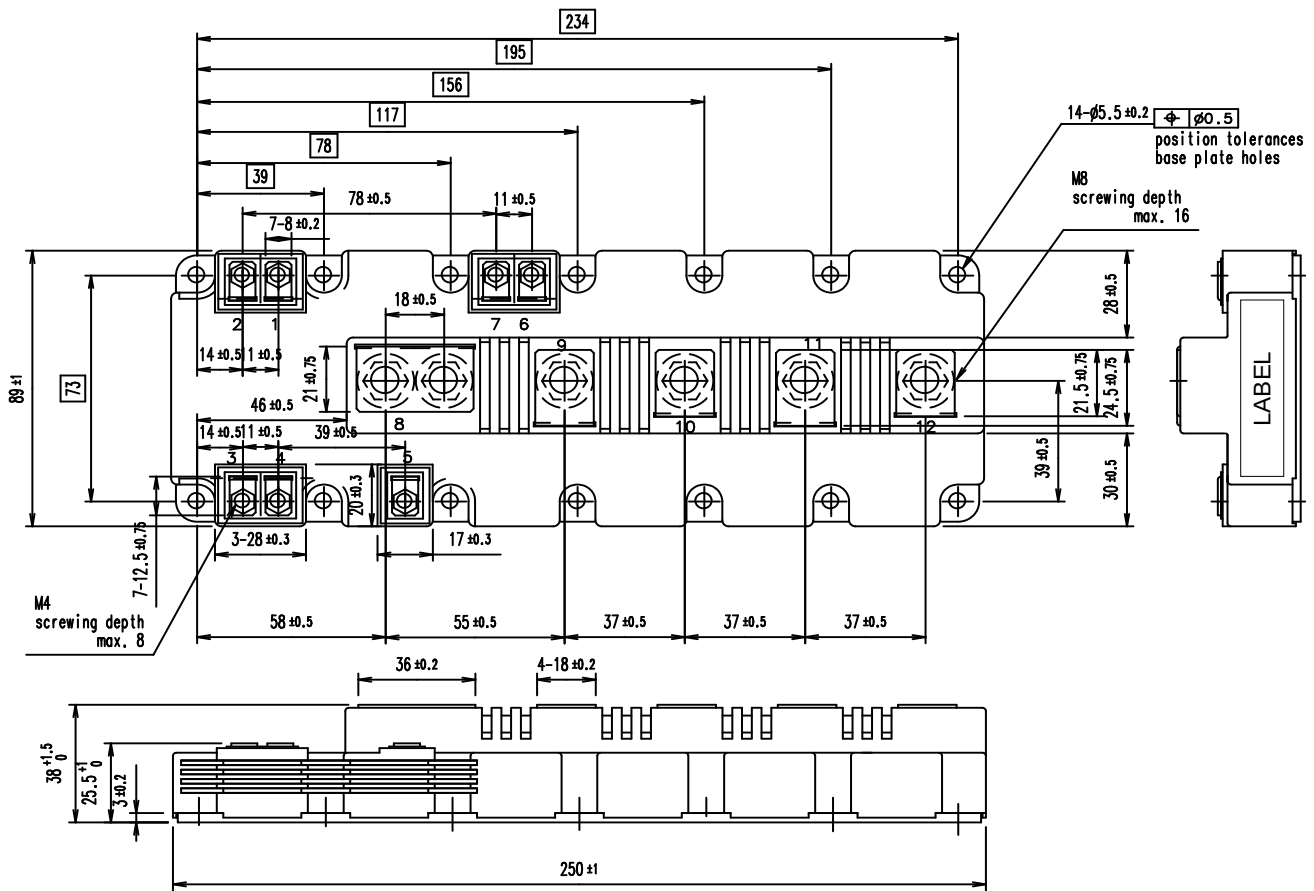


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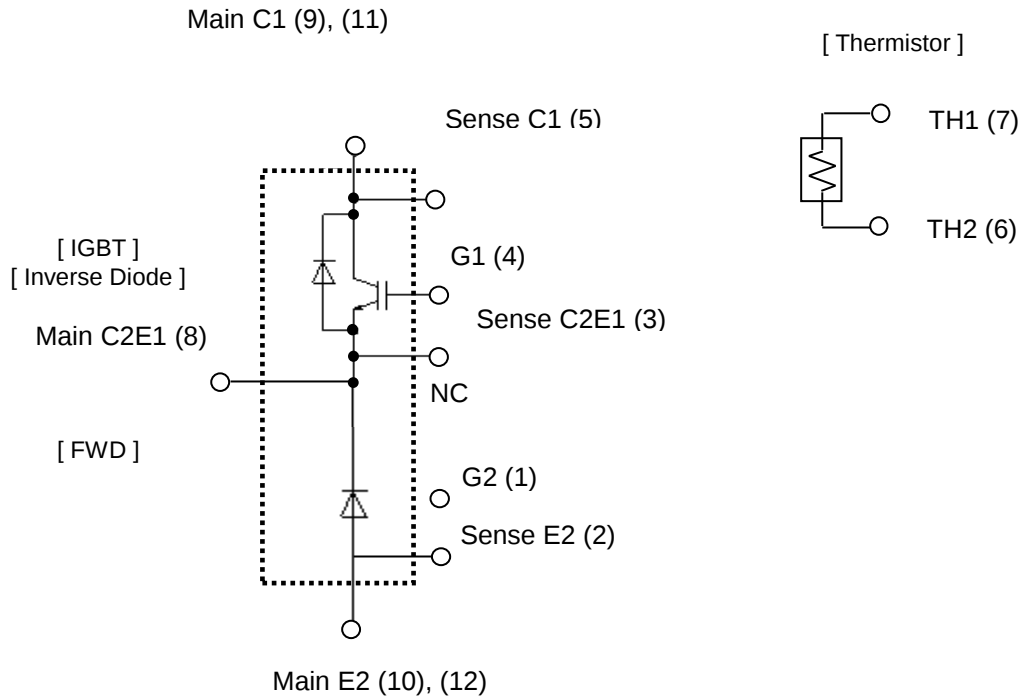
■ Outline Drawings,mm



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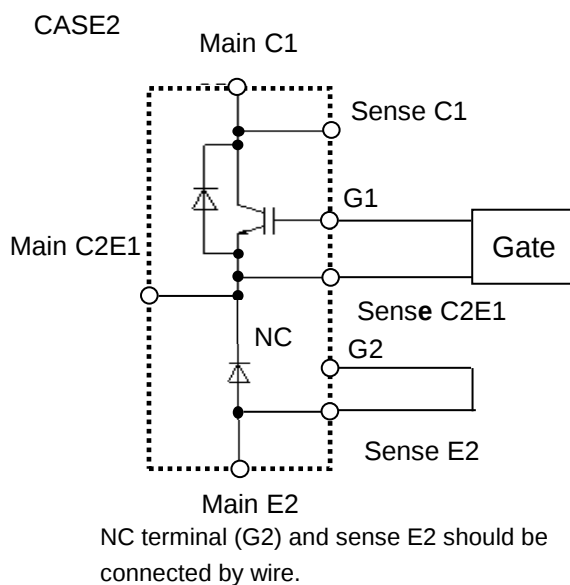
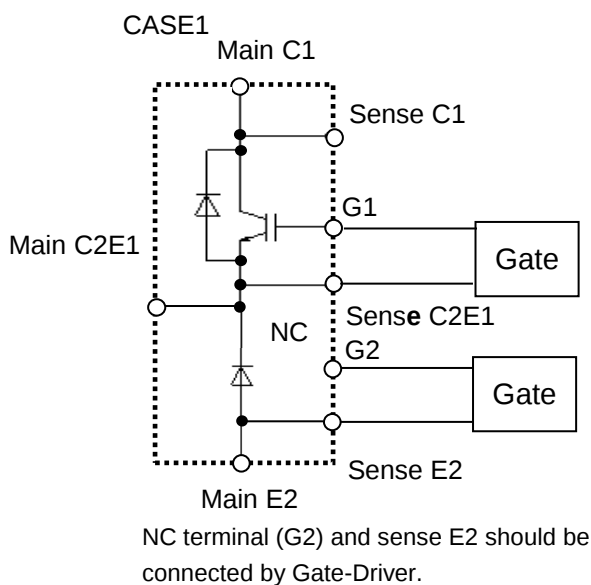
■Equivalent Circuit



NOTICE

There is recommendation of wiring for NC terminal below.

■ Fuji recommends wire connection of CASE1 or CASE2 to fix NC terminal voltage.



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