

1MB|1400VXB-170PH-54

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	$T_C=25^{\circ}C$ 1800 $T_C=100^{\circ}C$ 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	
Juncution temperrature		T_j		175	$^{\circ}C$
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.	4000	VAC
	between thermistor and others *2				
Screw	Mounting	-	M5	6.0	N·m
Torque	Main Terminals	-	M8	10.0	
*3	Sense Terminals	-	M4	2.1	

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		-	-	12.0	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		-	1350	-	nsec
		t _r	I _C = 1400A		-	300	-	
		t _{r(l)}	V _{GE} = ±15V		-	150	-	
	Turn-off Time	t _{off}	R _G = +0.47/-0.68Ω		-	1800	-	nsec
		t _f	L _S =60nH		-	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 for Lower arm.

■ Thermal resistance characteristics

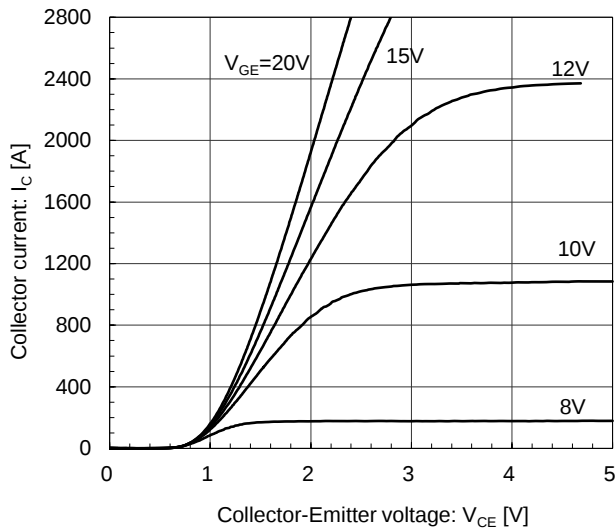
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.017	$^{\circ}\text{C/W}$
		Inverter Diode	-	-	0.032	
		FWD	-	-	0.032	
Contact thermal resistance (1device)*5	$R_{th(c-f)}$	with Thermal Compound	-	0.0042	-	

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

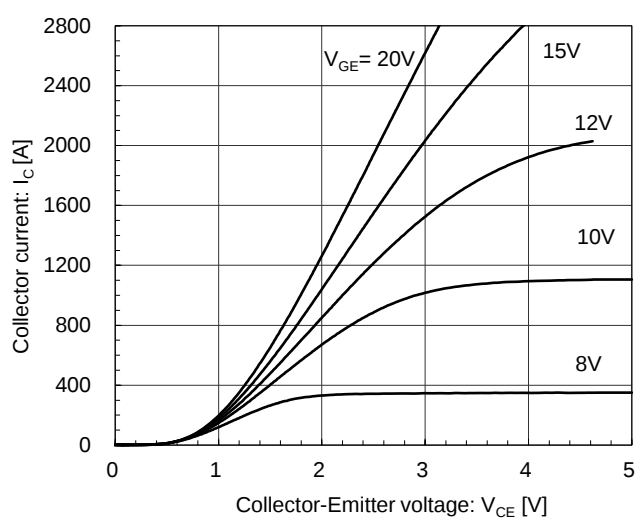
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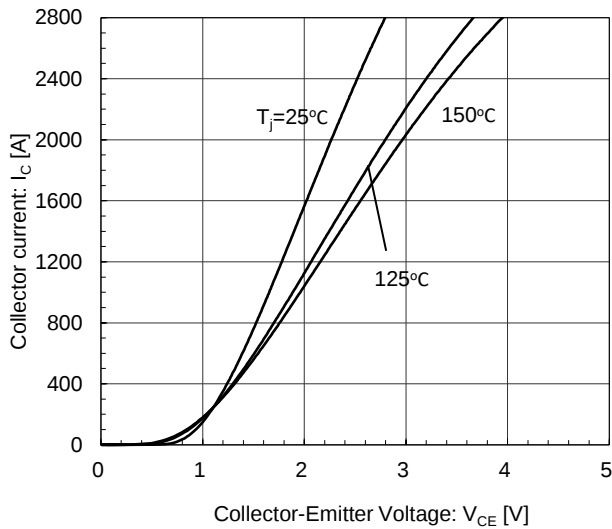
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J=25^\circ\text{C}$ / chip



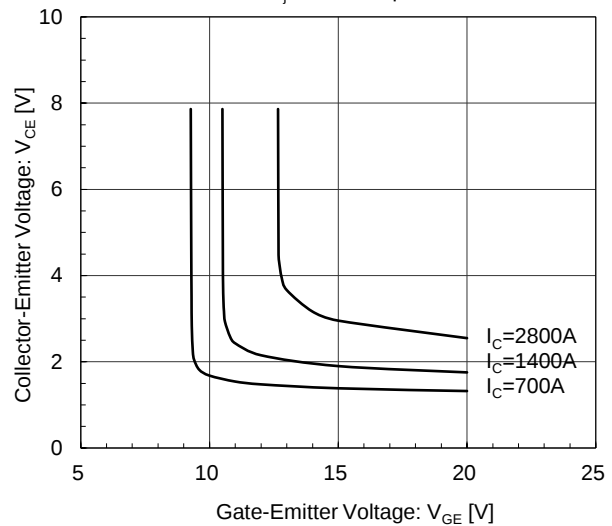
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J=150^\circ\text{C}$ / chip



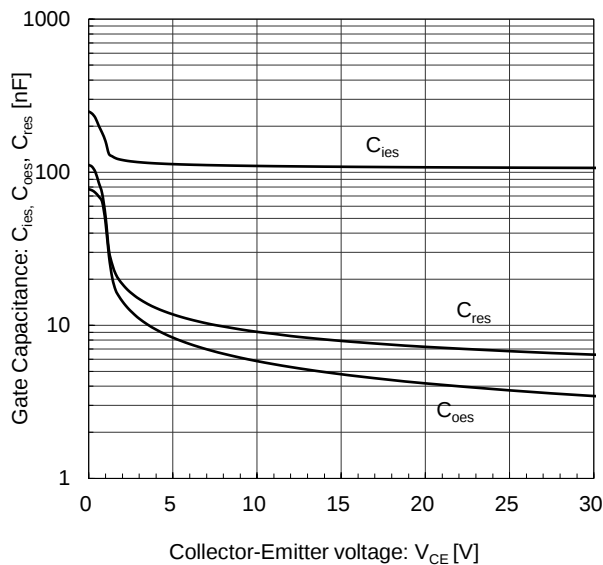
Collector current vs. Collector-Emitter voltage
 $V_{GE}=15\text{ V}$ / chip



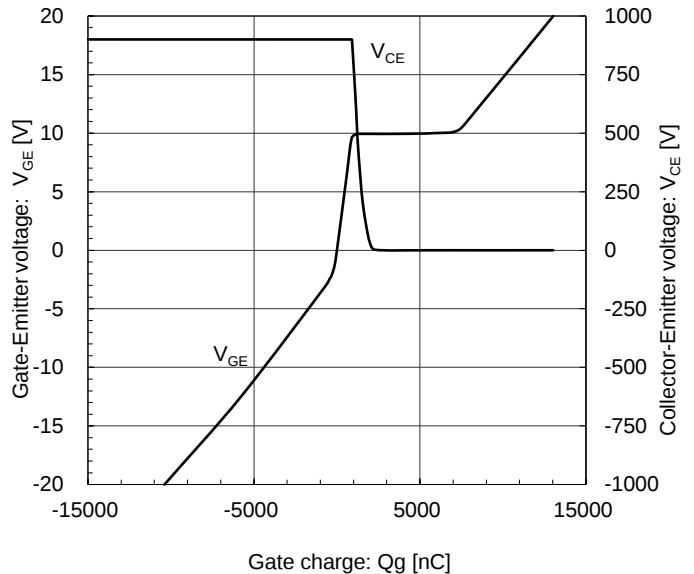
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_J=25^\circ\text{C}$ / chip



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

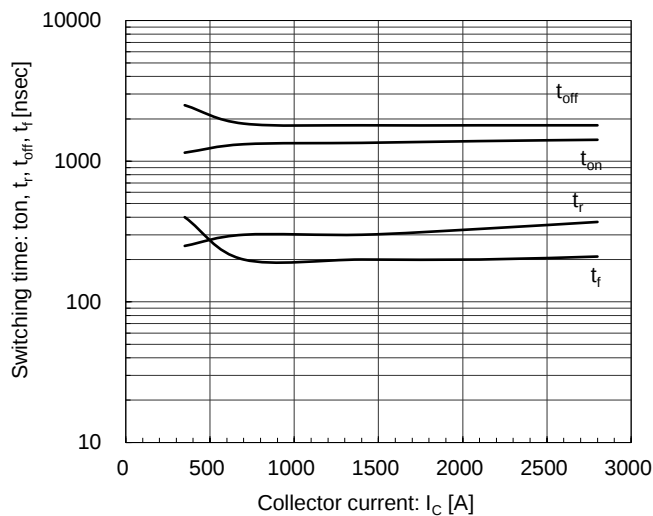


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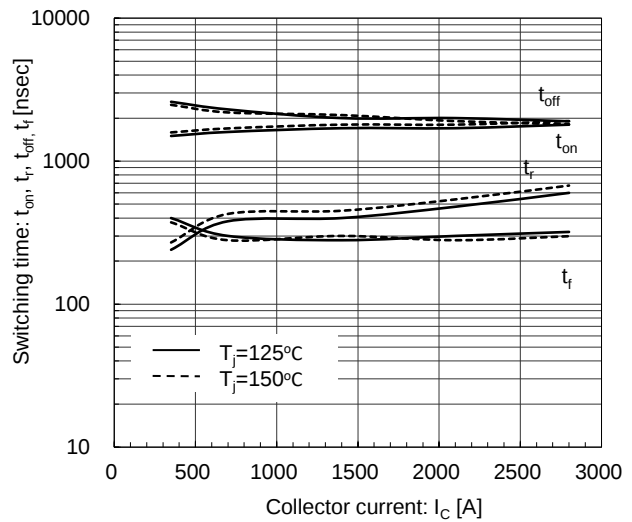
Switching time vs. Collector current (typ.)

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



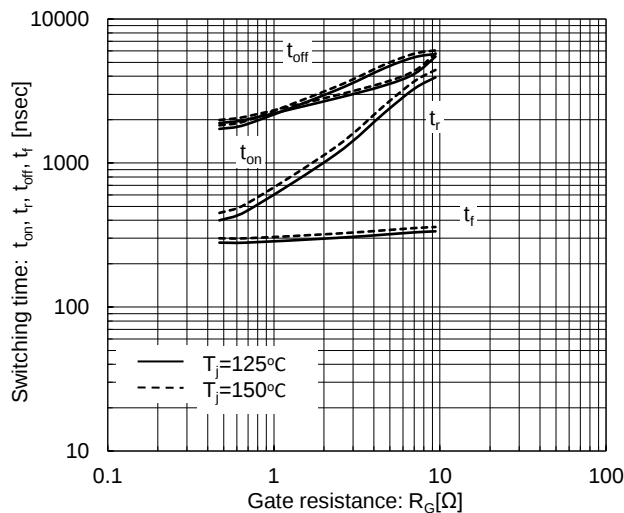
Switching time vs. Collector current (typ.)

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



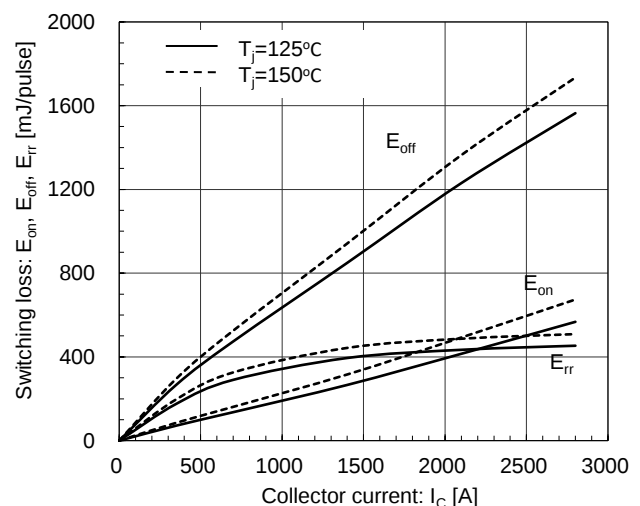
Switching time vs. Gate resistance (typ.)

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



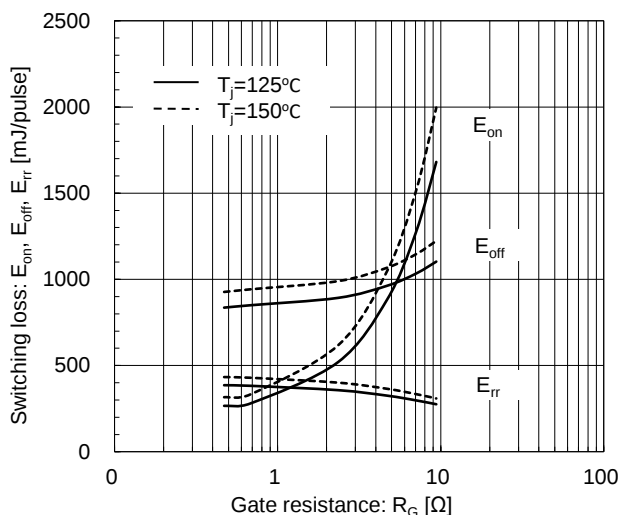
Switching loss vs. Collector current (typ.)

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



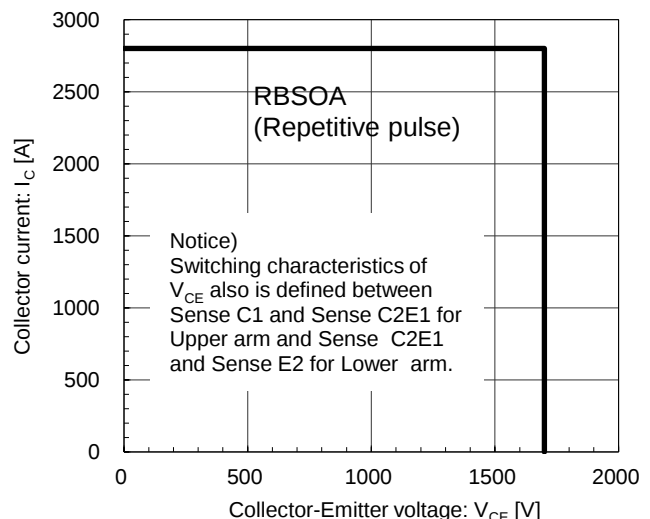
Switching loss vs. Gate resistance (typ.)

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



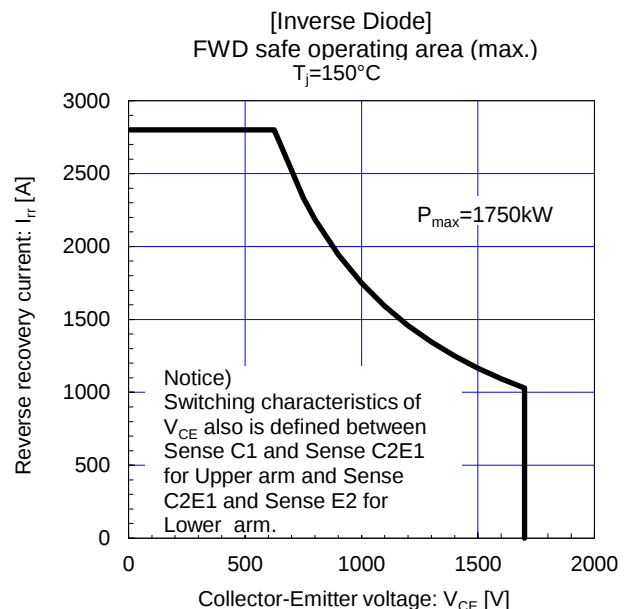
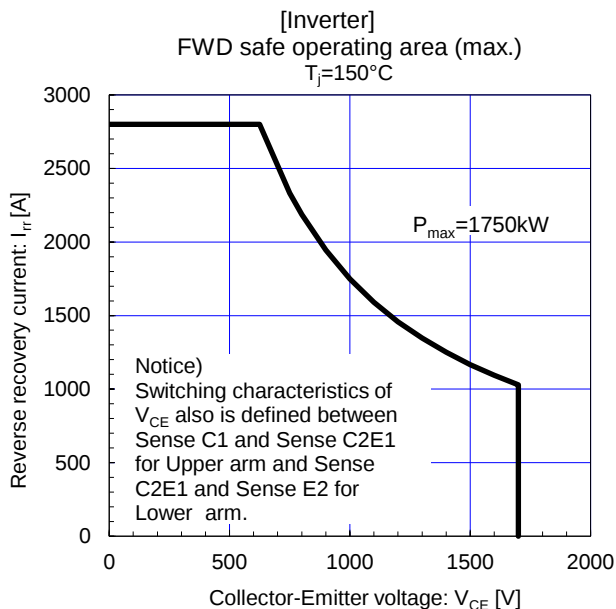
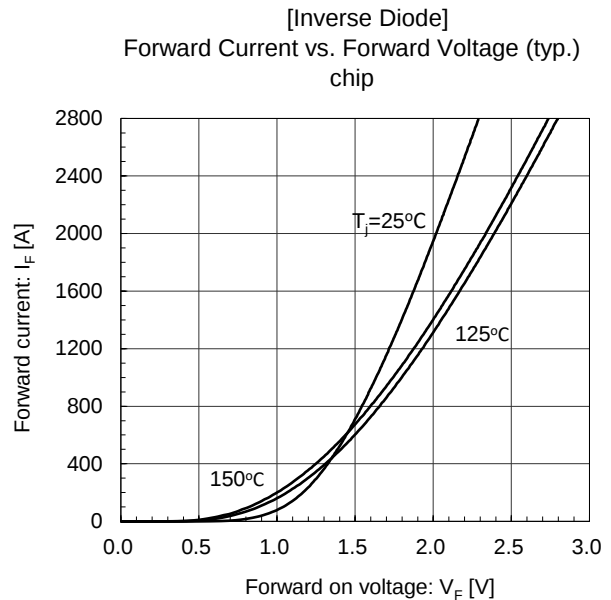
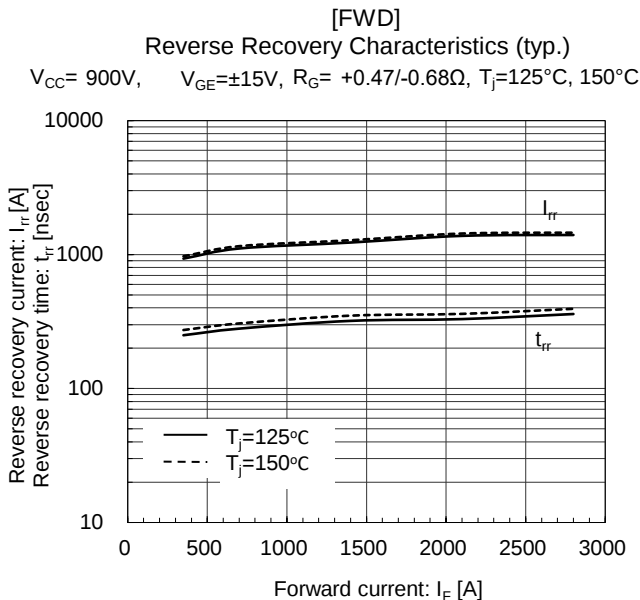
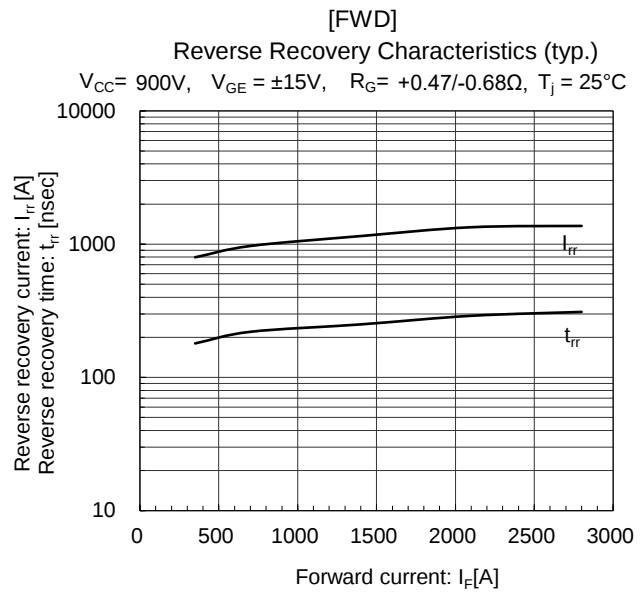
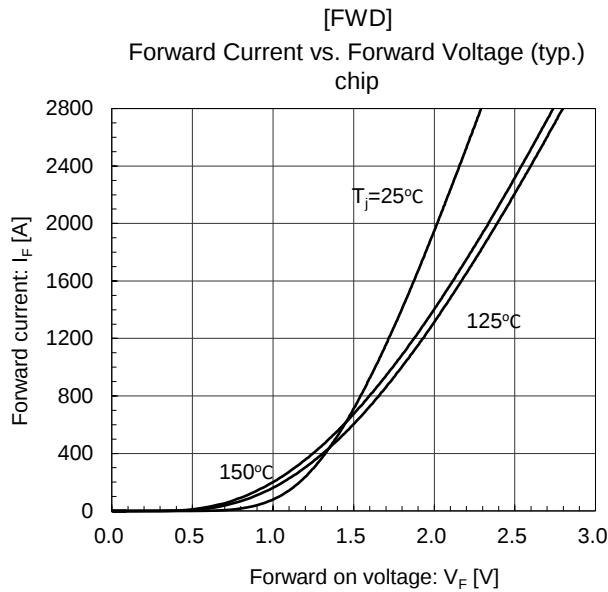
Reverse bias safe operating area (max.)

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



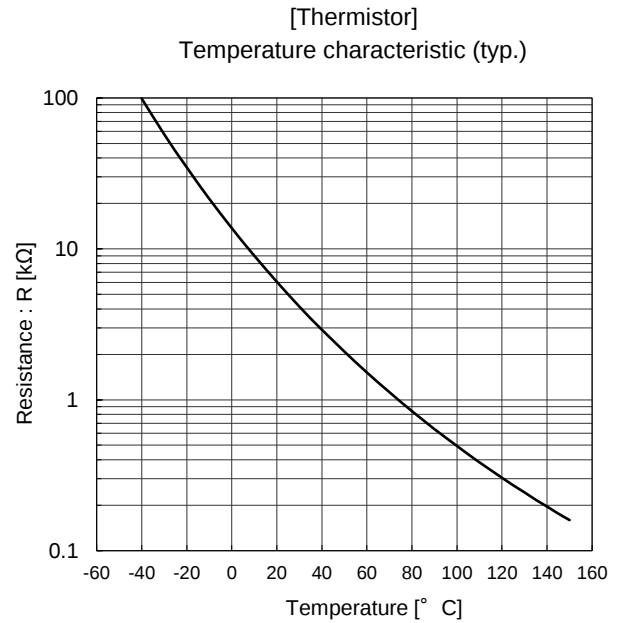
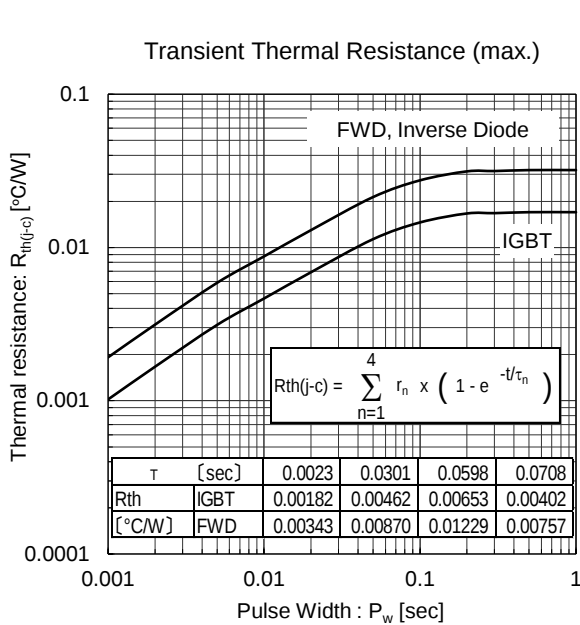
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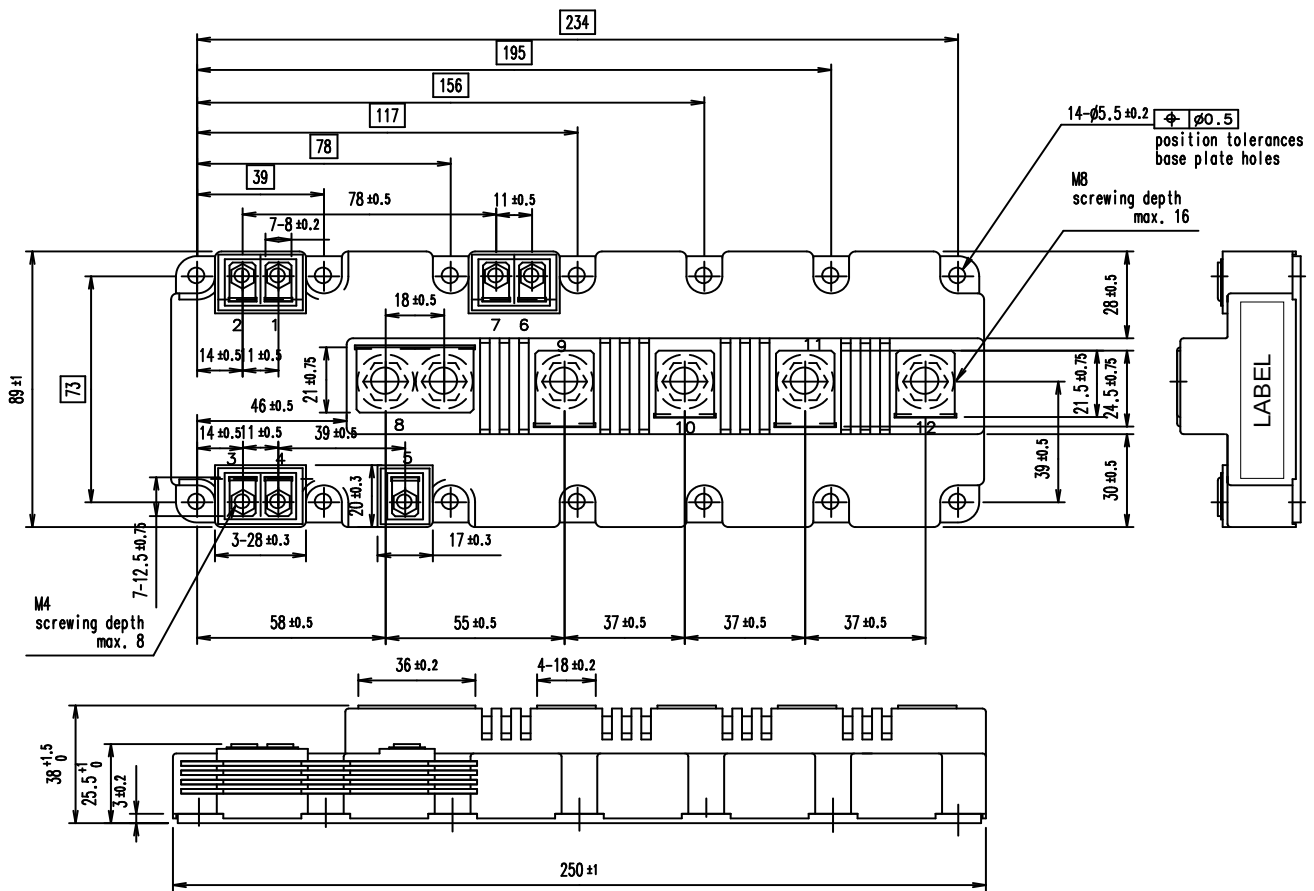


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Outline Drawing, mm

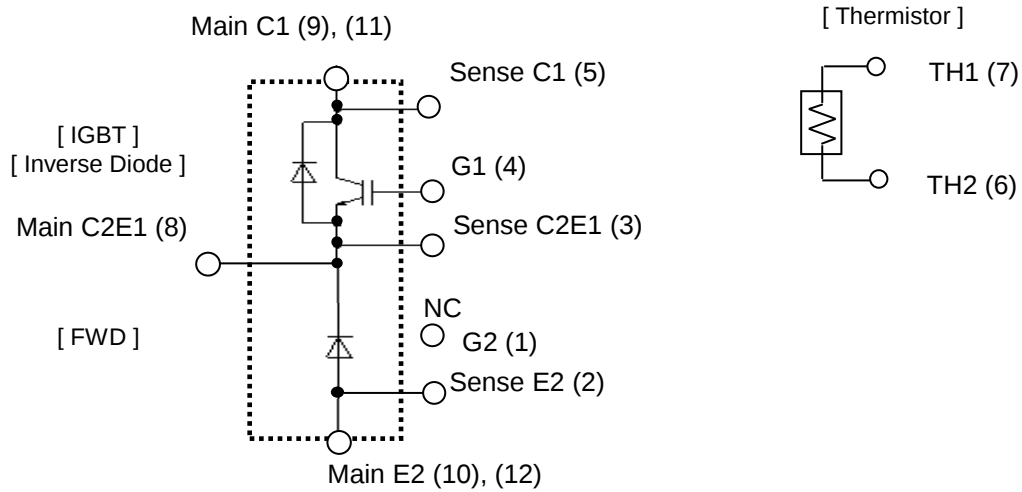


Weight: 1250g (typ.)

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■Equivalent Circuit

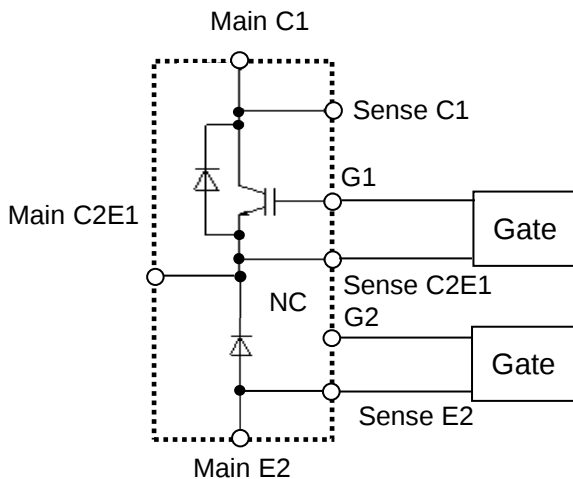


NOTICE

There is a recommendation of wiring for NC terminal below.

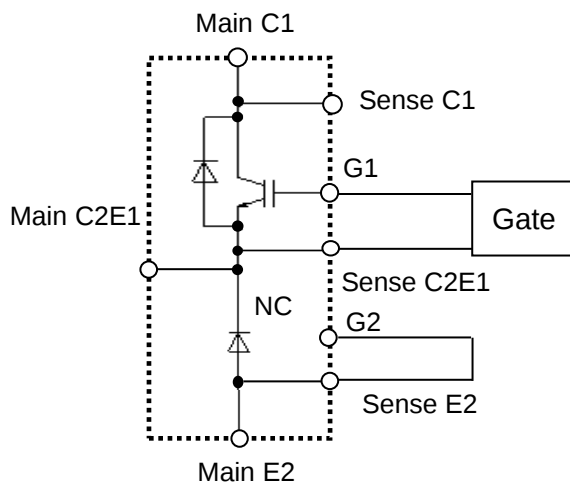
■ Fuji recommends wire connection of CASE1 or CASE2 to fix NC terminal voltage.

CASE1



NC terminal (G2) and sense E2 should be connected by Gate-Driver.

CASE2



NC terminal (G2) and sense E2 should be connected by wire.

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