

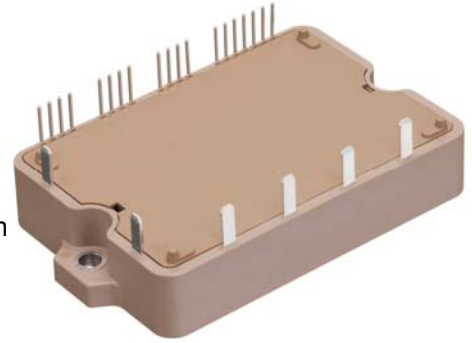
6MBP100VFN060-50

IGBT Modules

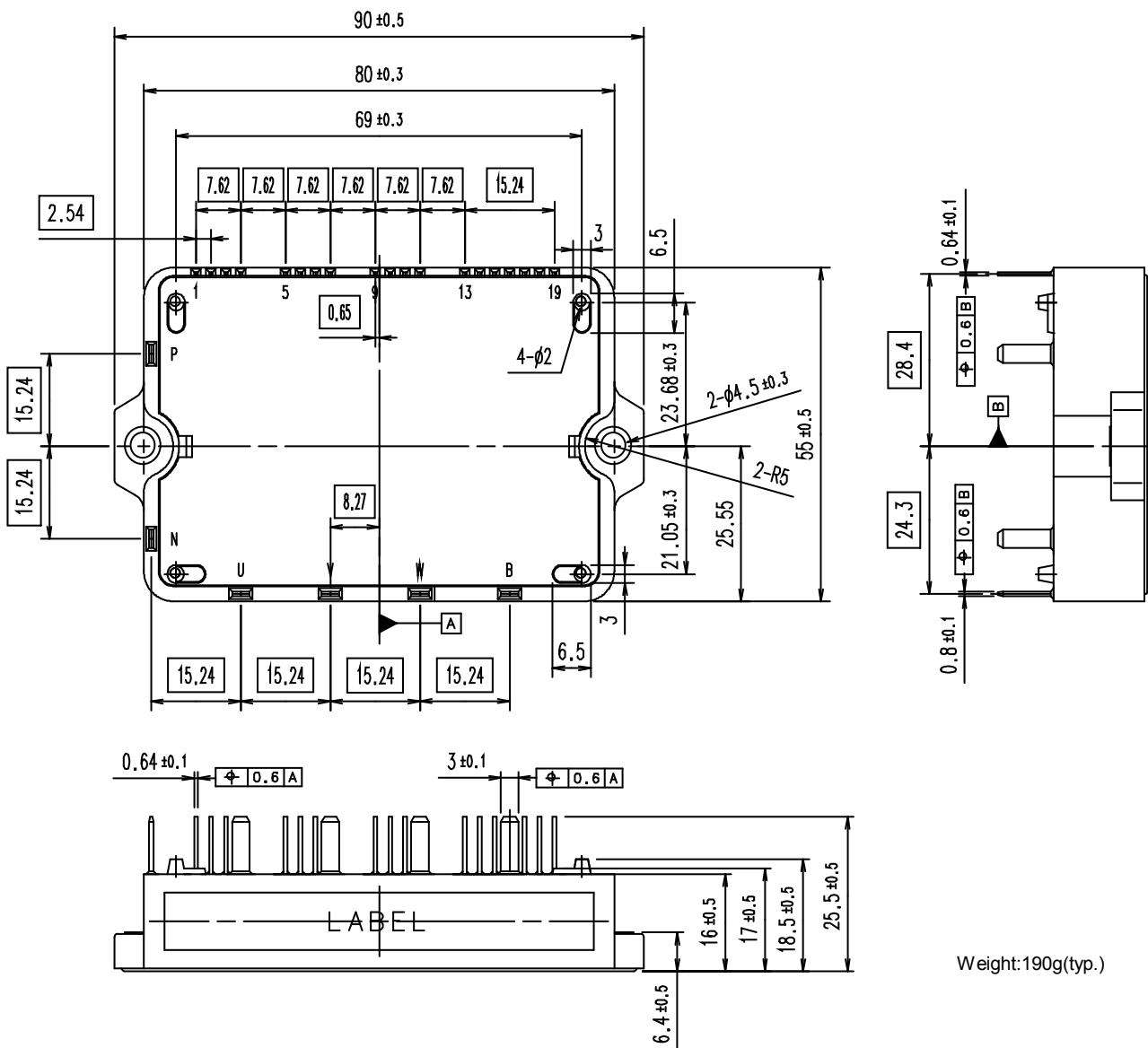
IGBT Module (V series)
600V / 100A / IPM

■ **Features**

- Temperature protection provided by directly detecting the junction temperature of the IGBTs
- Low power loss and soft switching
- High performance and high reliability IGBT with overheating protection
- Higher reliability because of a big decrease in number of parts in built-in control circuit



■ **Outline drawing (Unit : mm)**



Weight: 190g(typ.)

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Absolute Maximum Ratings

T_c=25°C, V_{cc}=15V unless otherwise specified.

Items		Symbol	Min.	Max.	Units	
Collector-Emitter Voltage *1		V _{CES}	0	600	V	
Short Circuit Voltage		V _{sc}	200	400	V	
Inverter	Collector Current	DC	I _c	-	100	A
		1ms	I _{CP}	-	200	A
		Duty=100% *2	-I _c	-	100	A
Collector Power Dissipation		1 device *3	P _C	-	403	W
Brake	Collector Current	DC	I _c	-	-	A
		1ms	I _{CP}	-	-	A
		Forward Current of Diode	I _F	-	-	A
Collector Power Dissipation		1 device *3	P _C	-	-	W
Supply Voltage of Pre-Driver *4		V _{CC}	-0.5	20	V	
Input Signal Voltage *5		V _{in}	-0.5	V _{cc} +0.5	V	
Alarm Signal Voltage *6		V _{ALM}	-0.5	V _{cc}	V	
Alarm Signal Current *7		I _{ALM}	-	20	mA	
Junction Temperature		T _j	-	150	°C	
Operating Case Temperature		T _{opr}	-20	110	°C	
Storage Temperature		T _{stg}	-40	125	°C	
Solder Temperature *8		T _{sol}	-	260	°C	
Isolating Voltage *9		V _{iso}	-	AC2500	V _{rms}	
Screw Torque		Mounting (M4)	-	-	1.7	Nm

Notes

- *1: V_{CES} shall be applied to the input voltage between terminal P-(U,V, W,B) and (U,V, W,B)-N.
- *2: Duty=125°C/R_{th(j-c)}D/(I_F×V_F Max.)×100
- *3: P_C=125°C/R_{th(j-c)}Q (Inverter & Brake)
- *4: V_{CC} shall be applied to the input voltage between terminal No.4 and 1, 8 and 5, 12 and 9,14 and 13.
- *5: V_{in} shall be applied to the input voltage between terminal No.3 and 1, 7 and 5, 11 and 9,15~18 and 13.
- *6: V_{ALM} shall be applied to the voltage between terminal No.2 and 1, 6 and 5, 10 and 9,19 and 13.
- *7: I_{ALM} shall be applied to the input current to terminal No.2,6,10 and 19.
- *8: Immersion time 10±1sec. 1time
- *9: Terminal to base, 50/60Hz sine wave 1min. All terminals should be connected together during the test.

Electrical Characteristics (T_j=25°C, V_{CC}=15V unless otherwise specified.)

Main circuit

Item		Symbol	Conditions	Min.	Typ.	Max.	Units	
Inverter	Collector Current at off signal input	I _{CES}	V _{CE} = 600V	-	-	1.0	mA	
	Collector-Emitter saturation voltage	V _{CE(sat)}	I _C = 100A	Terminal	-	-	1.95	V
				Chip	-	1.25	-	V
Forward voltage of FWD	V _F	I _F = 100A	Terminal	-	-	2.2	V	
			Chip	-	1.6	-	V	
Brake	Collector Current at off signal input	I _{CES}	V _{CE} =	-	-	-	mA	
	Collector-Emitter saturation voltage	V _{CE(sat)}	I _C =	Terminal	-	-	-	V
				Chip	-	-	-	V
Forward voltage of FWD	V _F	I _F =	Terminal	-	-	-	V	
			Chip	-	-	-	V	
Switching time	t _{on}	V _{DC} = 300V , T _j =125°C		1.1	-	-	μs	
	t _{off}	I _C = 100A		-	-	2.1	μs	
	t _{tr}	V _{DC} = 300V I _F = 100A		-	-	0.3	μs	

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● **Control circuit**

Item	Symbol	Conditions	Min.	Typ.	Max.	Units	
Supply current of P-side pre-driver (per one unit)	I _{ccp}	Switching Frequency = 0-15kHz T _c =-20~110°C	-	-	17	mA	
Supply current of N-side pre-driver	I _{ccn}		-	-	51	mA	
Input signal threshold voltage	V _{inth(on)}	V _{in} -GND	ON	1.2	1.4	1.6	V
	V _{inth(off)}		OFF	1.5	1.7	1.9	V

● **Protection Circuit**

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
Over Current Protection Level	I _{oc}	T _j =125°C Resistance Load	200	-	-	A
Over Current Protection Delay time	t _{dOC}	T _j =125°C	-	5	-	μs
Short Circuit Protection Delay time	t _{sc}	T _j =125°C	-	2	3	μs
IGBT Chips Over Heating Protection Temperature Level	T _{jOH}	Surface of IGBT Chips	150	-	-	°C
Over Heating Protection Hysteresis	T _{jH}		-	20	-	°C
Under Voltage Protection Level	V _{UV}		11.0	-	12.5	V
Under Voltage Protection Hysteresis	V _H		0.2	0.5	-	V
Alarm Signal Hold Time	t _{ALM(OC)}	ALM-GND	1.0	2.0	2.4	ms
	t _{ALM(UV)}	T _c =-20~110°C V _{cc} ≥10V	2.5	4.0	4.9	ms
	t _{ALM(TjOH)}		5.0	8.0	11.0	ms
Resistance for current limit	R _{ALM}		960	1265	1570	Ω

■ **Thermal Characteristics (T_c = 25°C)**

Item	Symbol	Min.	Typ.	Max.	Units	
Junction to Case Thermal Resistance*10	Inverter	IGBT	-	-	0.31	°C/W
		FWD	-	-	0.55	°C/W
	Brake	IGBT	-	-	-	°C/W
		FWD	-	-	-	°C/W
Case to Fin Thermal Resistance with Compound	R _{th(c-f)}	-	0.05	-	°C/W	

*10: For 1device , the measurement point of the case is just under the chip.

■ **Noise Immunity (V_{DC}=300V, V_{CC}=15V)**

Item	Conditions	Min.	Typ.	Max.	Units
Common mode rectangular noise	Pulse width 1μs,polarity ±,10min. Judge: no over-current, no miss operating	±2.0	-	-	kV

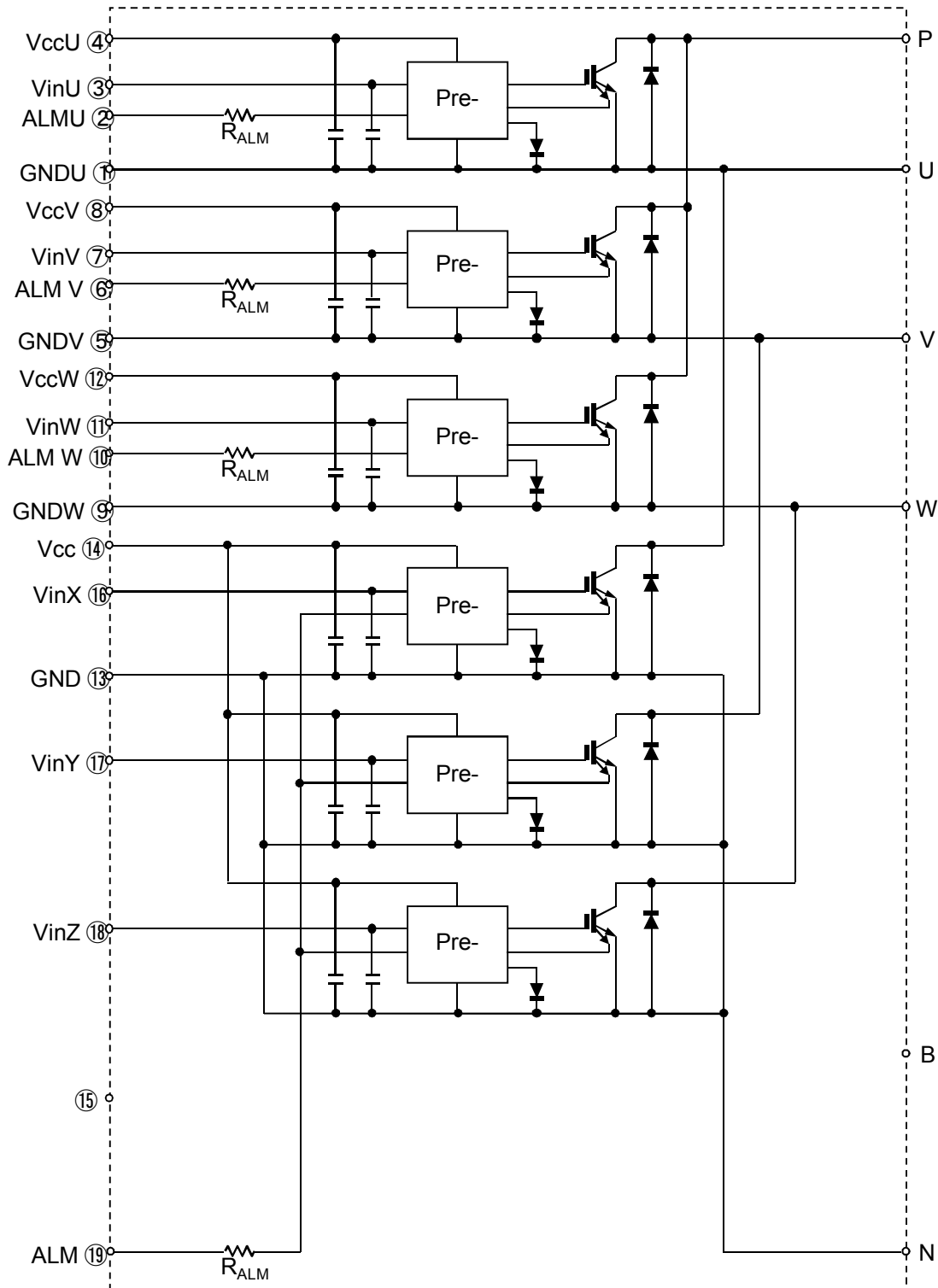
■ **Recommended Operating Conditions**

Item	Symbol	Min.	Typ.	Max.	Units
DC Bus Voltage	V _{DC}	-	-	400	V
Power Supply Voltage of Pre-Driver	V _{CC}	13.5	15.0	16.5	V
Switching frequency of IPM	f _{sw}	-	-	20	kHz
Arm shoot through blocking time for IPM's input signal	t _{dead}	1.0	-	-	μs
Screw Torque (M4)	-	1.3	-	1.7	Nm

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■ Block Diagram



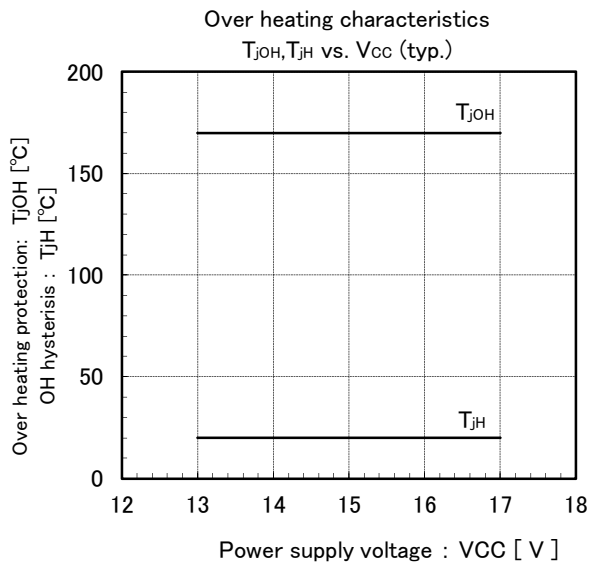
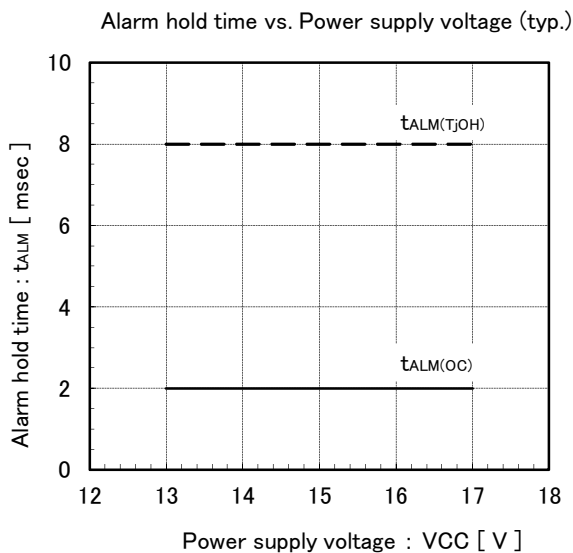
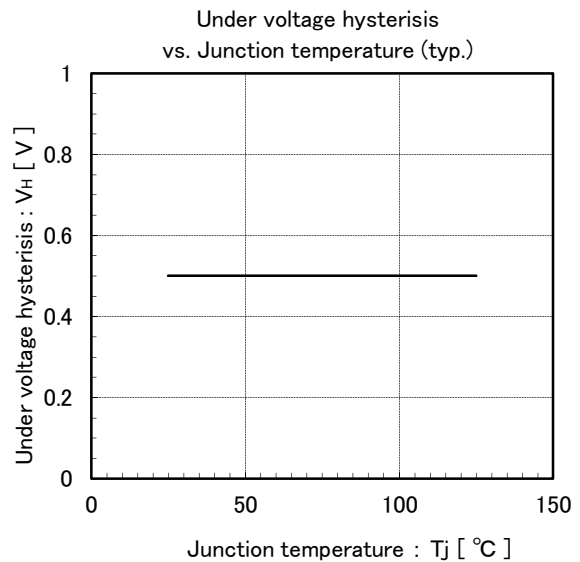
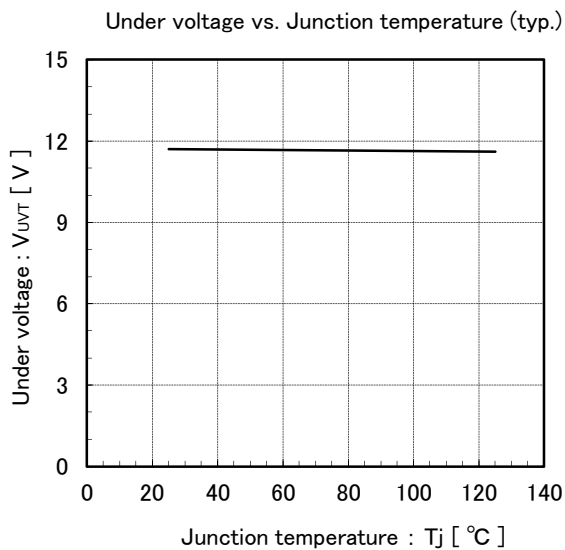
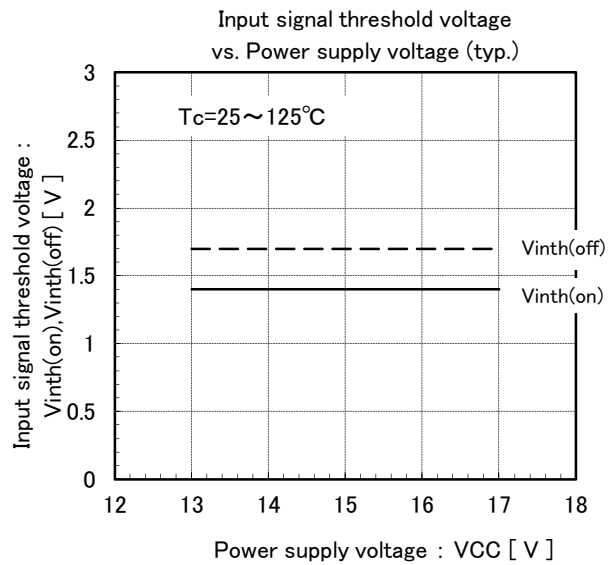
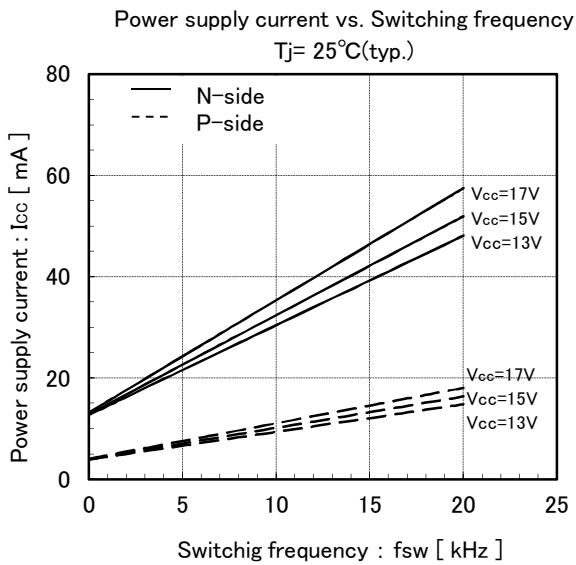
Pre-drivers include following functions

1. Amplifier for driver
2. Short circuit protection
3. Under voltage lockout circuit
4. Over current protection
5. IGBT chip over heating protection

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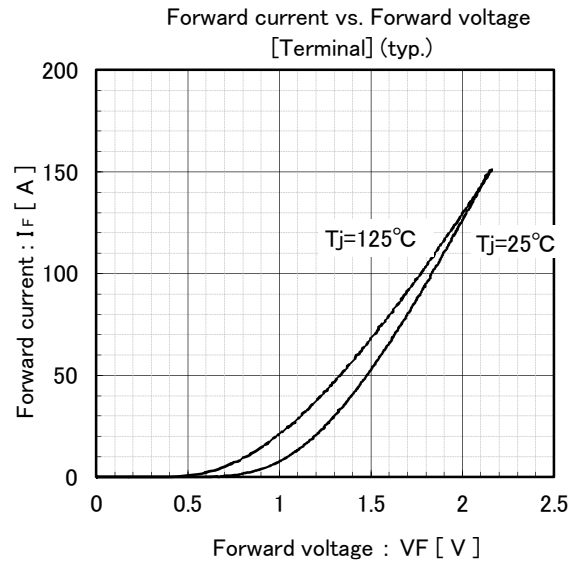
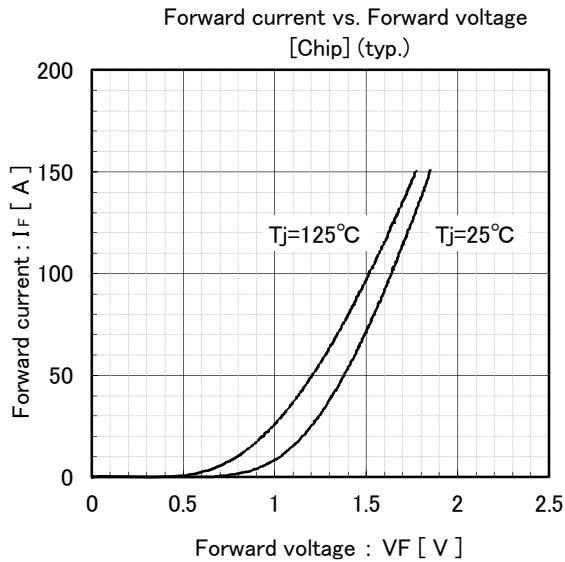
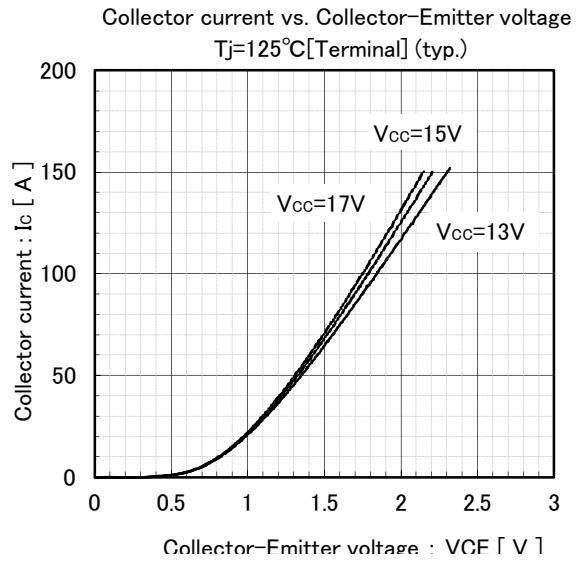
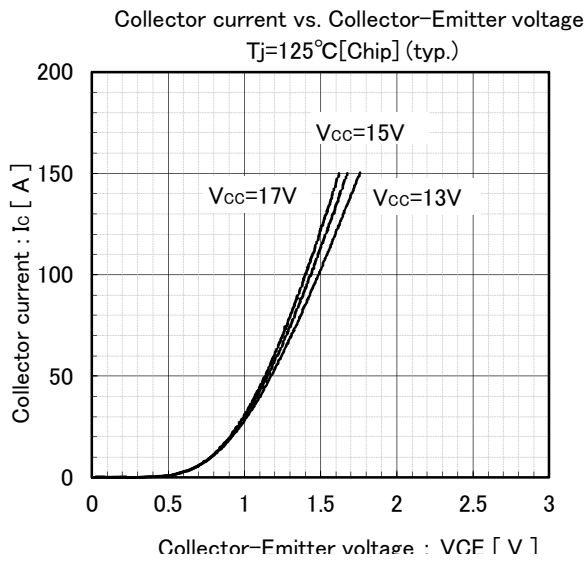
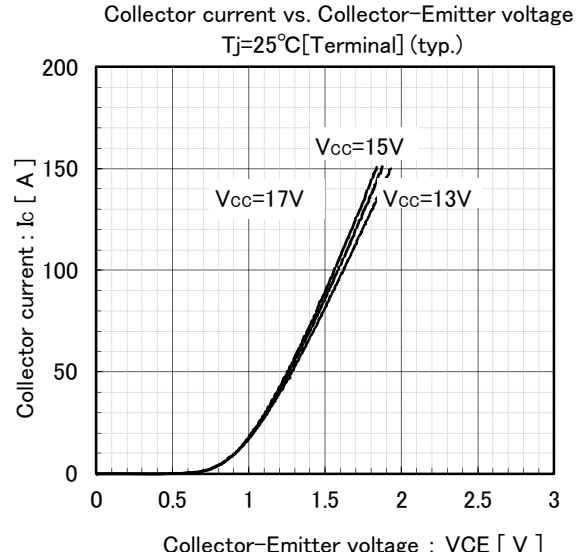
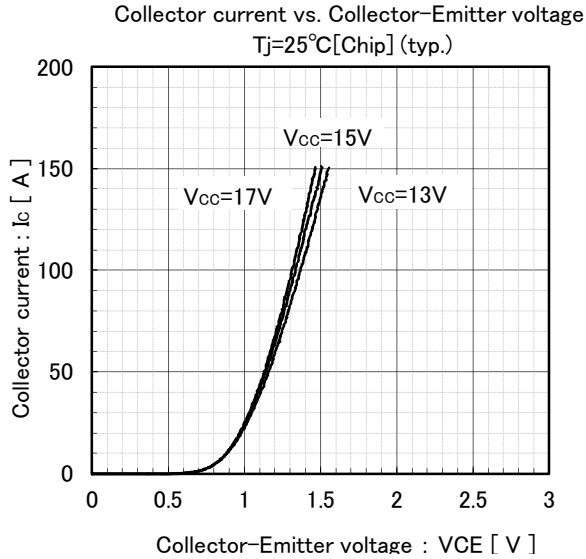
■ Characteristics (Representative)
● Control Circuit



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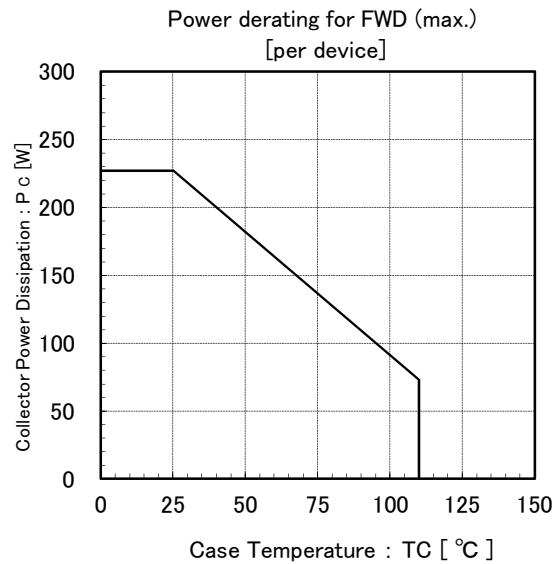
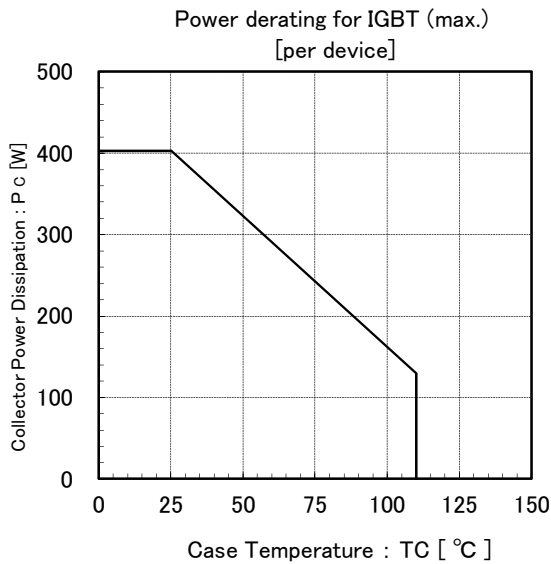
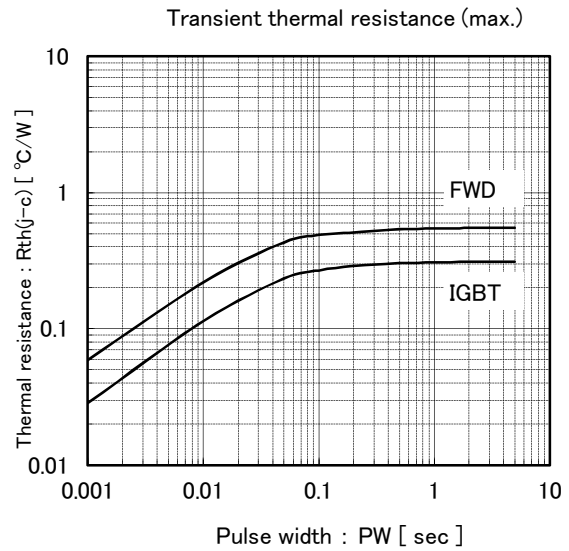
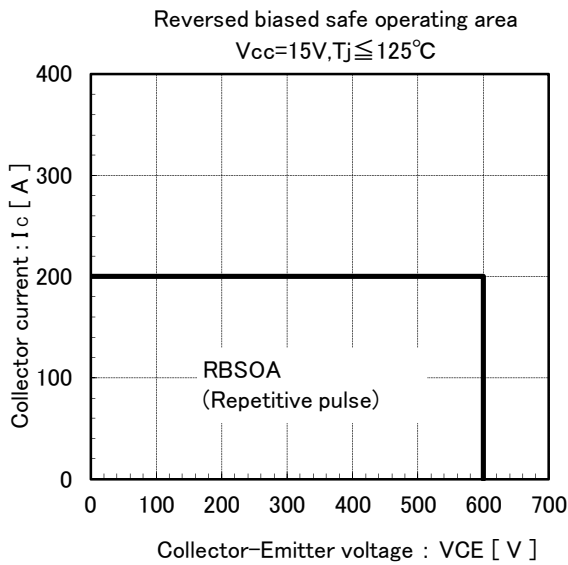
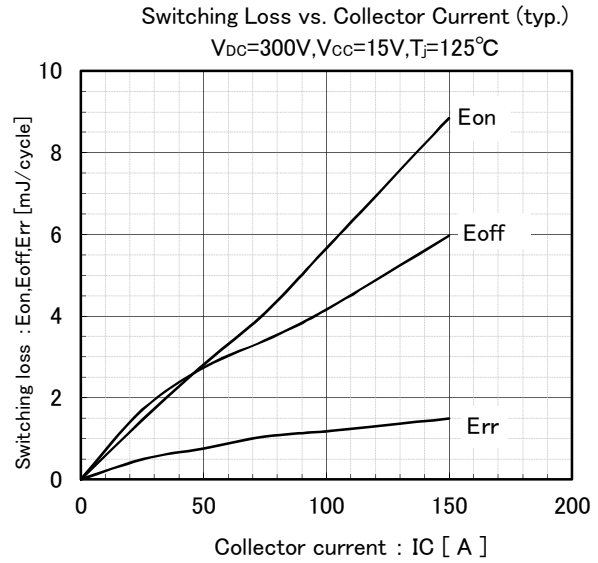
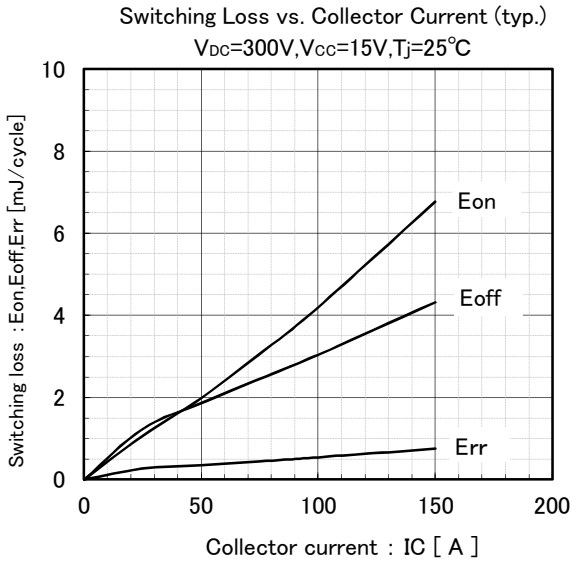
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● Inverter



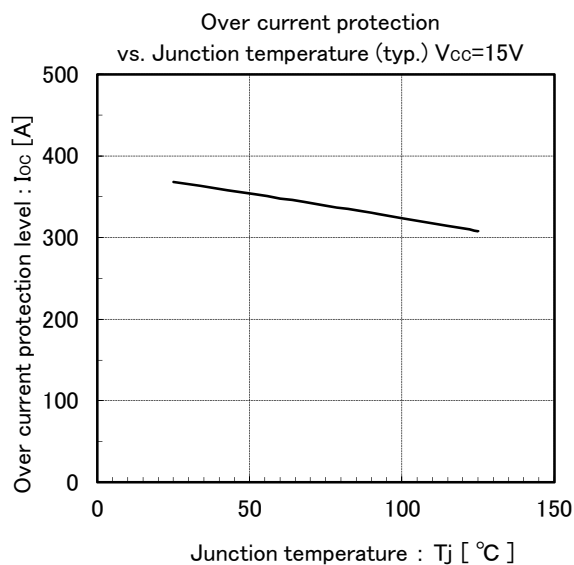
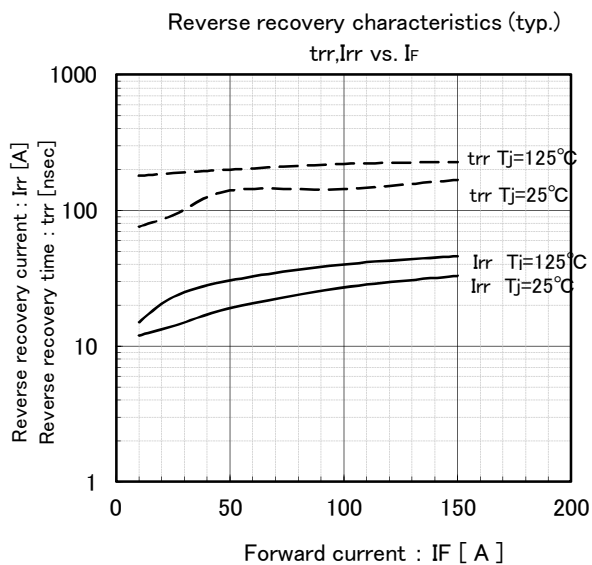
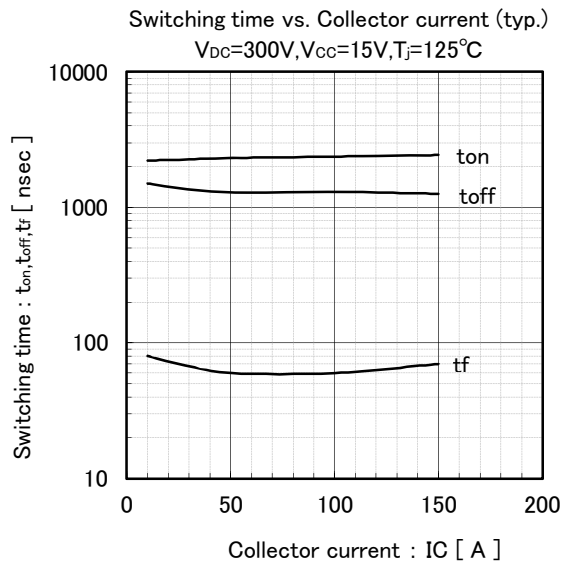
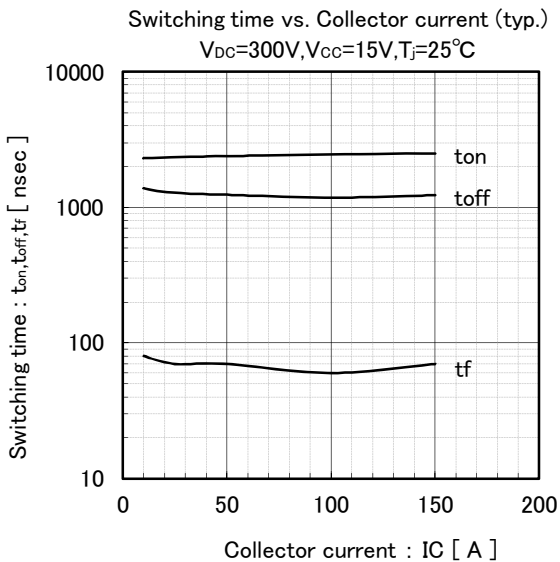
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