

4MBI400VF-120R-50

IGBT Modules

IGBT Power Module (V series)

1200V/400A/IGBT, $\pm 600V/450A/RB$ -IGBT, 4-in-1 package

■ Features

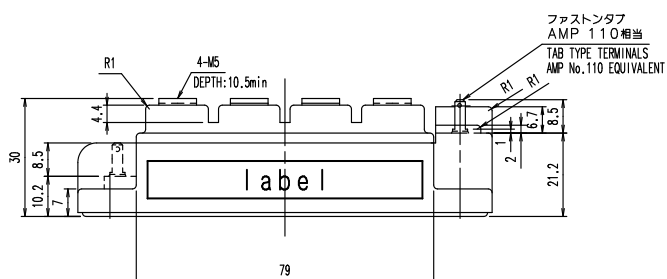
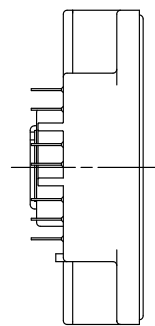
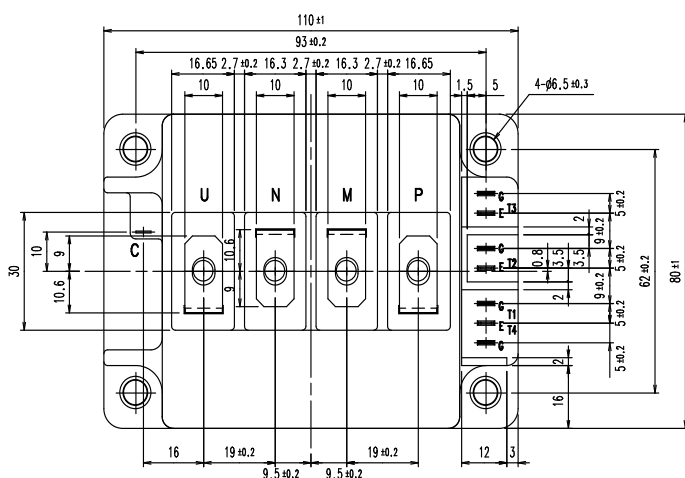
Higher efficiency
Optimized Advanced T-type circuit
Low inductance module structure

■ Applications

Inverter for motor drive
Uninterruptible power supply
Power conditioner

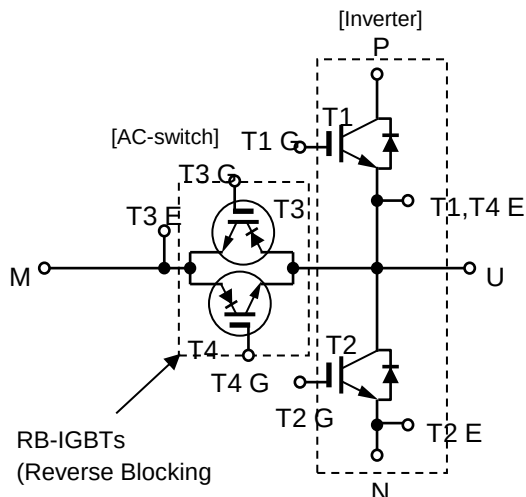
■ Outline drawing

(Unit : mm)



Weight: 460g (typ.)

■ Equivalent Circuit



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■ Absolute Maximum Ratings (at Tc= 25°C unless otherwise specified)

Item		Symbol	Condition		Maximum Rating	Unit
T1, T2	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	I_C	Continuous	Tc=80°C	400	A
			I _C pulse	1ms	800	
		-I _C			300	
			-I _C pulse		800	
	Collector power dissipation	P_C	1 device		1835	W
	Junction temperature	T_j			150	°C
T3, T4	Operating temperature (under switching conditions)	T_{jop}			125	
	Collector-Emitter voltage	V_{CES}			±600	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	I_C	Continuous	Tc=80°C	450	A
		I _C pulse	1ms	Tc=80°C	900	
	Collector power dissipation	P_C	1 device		2230	W
	Junction temperature	T_j			150	°C
	Operating temperature (under switching conditions)	T_{jop}			125	
Case temperature		T_C			125	°C
Storage temperature		T_{stg}			-40 ~ +125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*2)	-	M5 or M6		3.5	Nm
	Terminal (*3)	-	M5		3.5	

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

(*2) Recommendable Value : 2.5-3.5 Nm (M5 or M6)

(*3) Recommendable Value : 2.5-3.5 Nm (M6)

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■ Electrical characteristics (at T_j= 25°C unless otherwise specified)

Item	Symbol	Condition	Characteristics			Units
			min.	typ.	max.	
Inverter	Zero gate voltage Collector current	V _{GE} = 0V V _{CE} = 1200V	-	-	2.0	mA
	Gate-Emitter leakage current	V _{CE} = 0V V _{GE} = ±20V	-	-	400	nA
	Gate-Emitter threshold voltage	V _{CE} = 20V I _C = 400mA	6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE(sat)} (chip)	-	2.00	2.25	
		I _C = 400A		2.40	-	
		V _{CE(sat)} (terminal)	-	2.20	2.55	
	Internal gate resistance	-	-	2.60	-	
				2.50	-	Ω
	Input capacitance	V _{CE} =10V, V _{GE} =0V, f=1MHz	-	27.6	-	nF
	Turn-on time	Switching mode: A V _{CC} = 400V I _C = 400A	-	1.10	-	μsec
			-	0.60	-	
			-	0.20	-	
	Turn-off time	V _{GE} = ±15V R _G = +8.2/-1Ω	-	0.60	-	
			-	0.10	-	
	Forward on voltage	I _F = 300A	-	1.95	2.20	V
				2.20	-	
		I _F = 300A	-	2.15	2.45	
				2.40	-	
	Reverse recovery time	Switching mode: B V _{CC} = 400V I _F = 400A V _{GE} = ±15V R _G = +6/-30Ω	-	0.15	-	μsec
AC-switch	Zero gate voltage Collector current	V _{GE} = 0V V _{CE} = 600V	-	-	4.0	mA
	Gate-Emitter leakage current	V _{CE} = 0V V _{GE} = ±20V	-	-	800	nA
	Gate-Emitter threshold voltage	V _{CE} = 20V I _C = 400mA	5.5	6.5	7.5	V
	Collector-Emitter saturation voltage	V _{CE(sat)} (chip)	-	2.45	2.80	
		I _C = 400A		2.60	-	
		V _{CE(sat)} (terminal)	-	2.65	3.15	
	Internal gate resistance	-	-	2.80	-	
				2.20	-	Ω
	Input capacitance	V _{CE} =10V, V _{GE} =0V, f=1MHz	-	26.0	-	nF
	Turn-on time	Switching mode: B V _{CC} = 400V I _C = 400A	-	0.35	-	μsec
			-	0.20	-	
			-	0.10	-	
	Turn-off time	V _{GE} = ±15V R _G = +6.0/-30Ω	-	1.00	-	
			-	0.10	-	
	Reverse recovery time	Switching mode: A V _{CC} = 400V I _F = 400A V _{GE} = ±15V R _G = +8.2/-1Ω	-	0.15	-	μsec
Internal inductance		P-N	-	40	-	nH
		P-M	-	33	-	
		M-N	-	33	-	

■ Thermal resistance characteristics

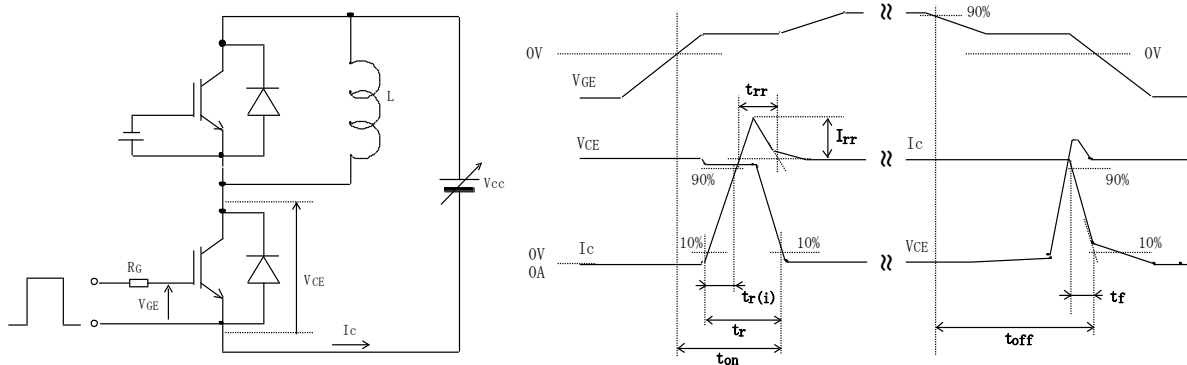
Item	Symbol	Condition	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	T1, T2 IGBT	-	-	0.068	°C/W
		T1, T2 FWD	-	-	0.173	
		T3, T4 RB-IGBT	-	-	0.056	
Contact thermal resistance (1device) (*1)	R _{th(c-f)}	T1, T2	-	0.025	-	
		T3, T4	-	0.013	-	

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

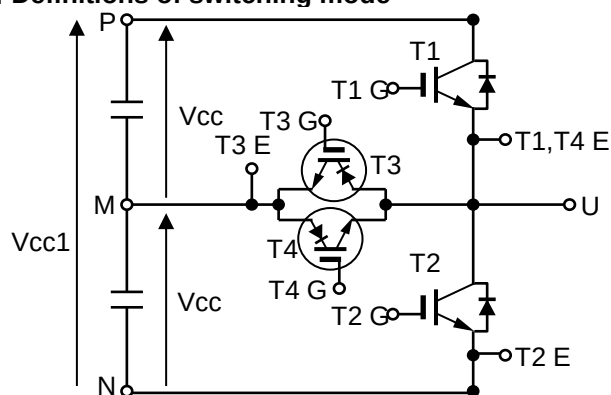
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■ Definitions of switching time



■ Definitions of switching mode



SW mode	Load L	T1	T2	T3	T4
A	M-U	SW	OFF	OFF	ON
	M-U	OFF	SW	ON	OFF
B	P-U	OFF	OFF	SW	ON
	U-N	OFF	OFF	ON	SW

SW: Connect to drive circuit and input gate signal

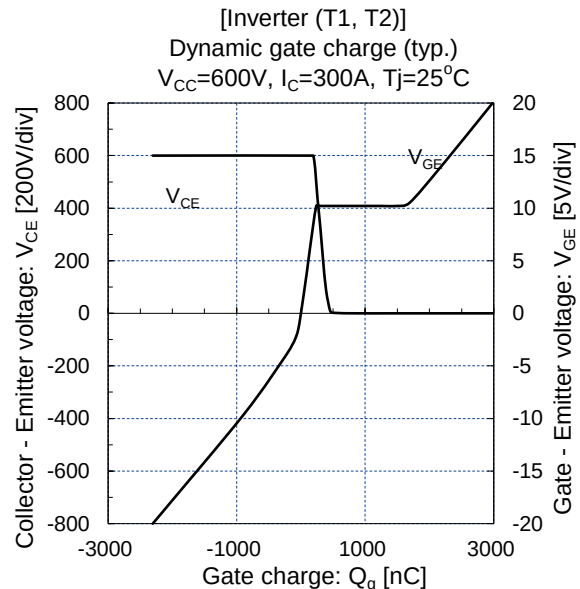
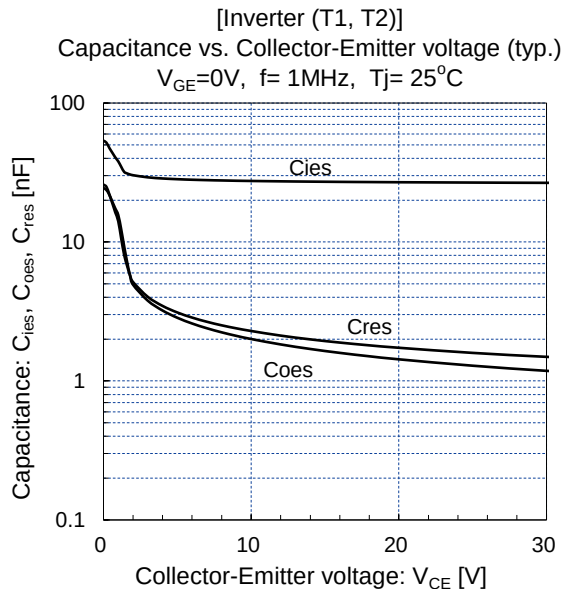
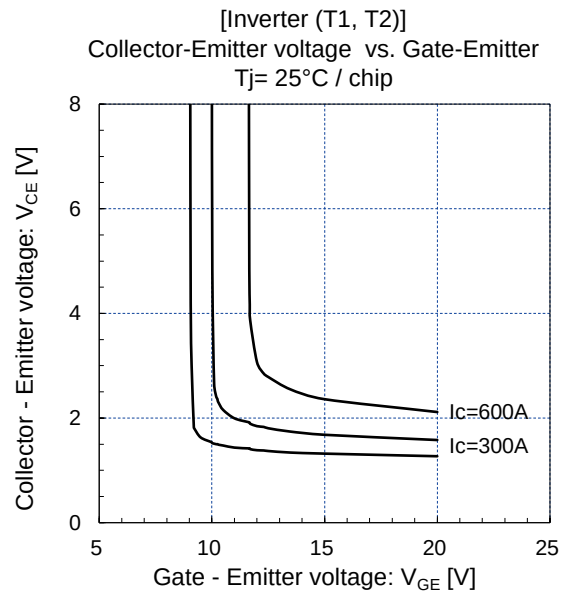
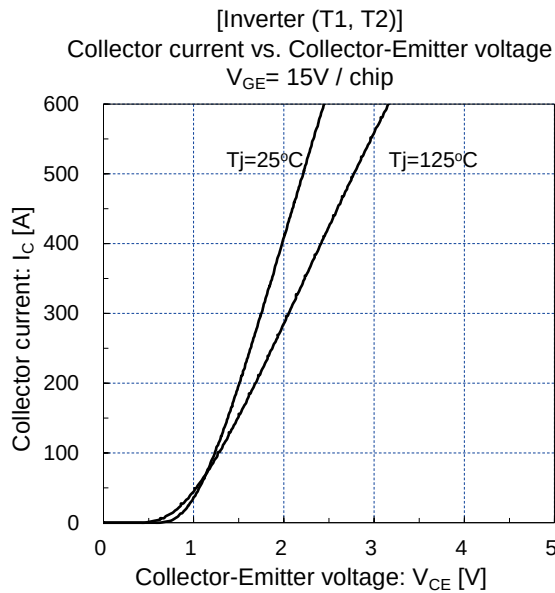
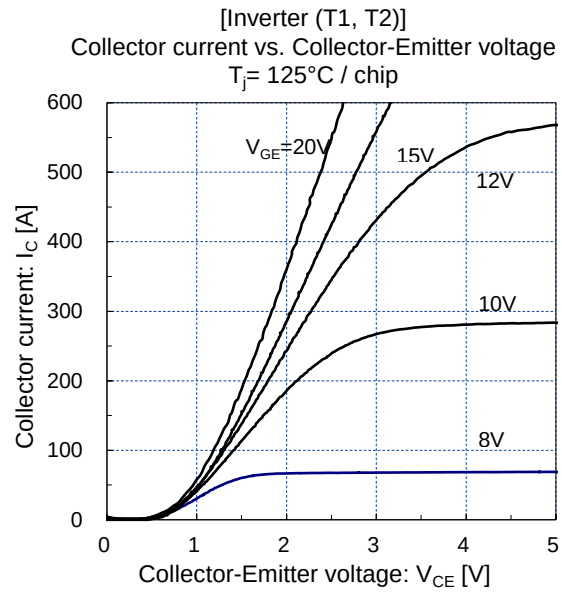
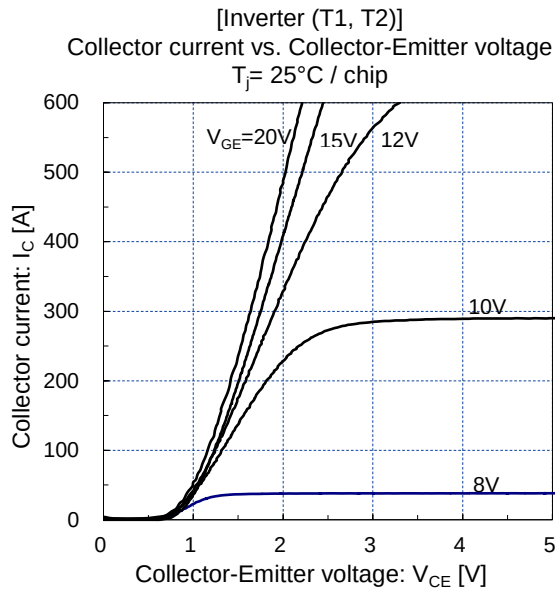
ON: Bias voltage of gate +15V

OFF: Reverse bias voltage of gate -15V

V_{CC}=V_{CC1}/2

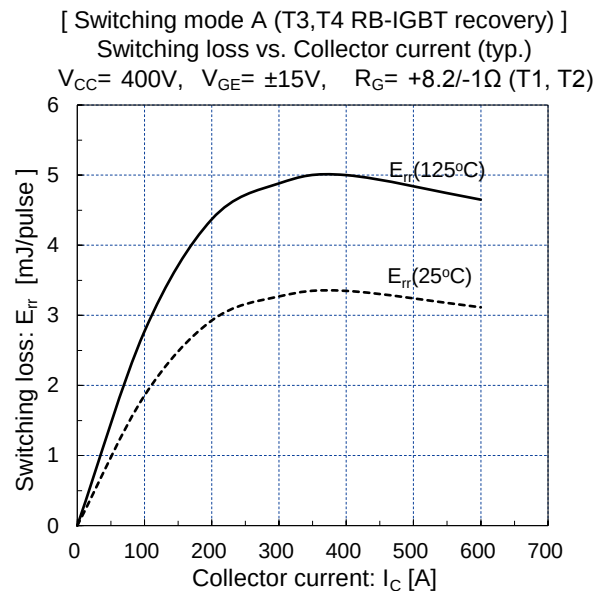
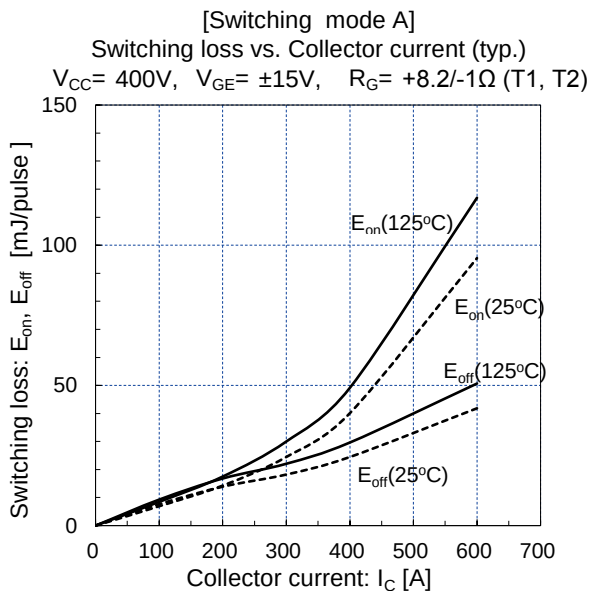
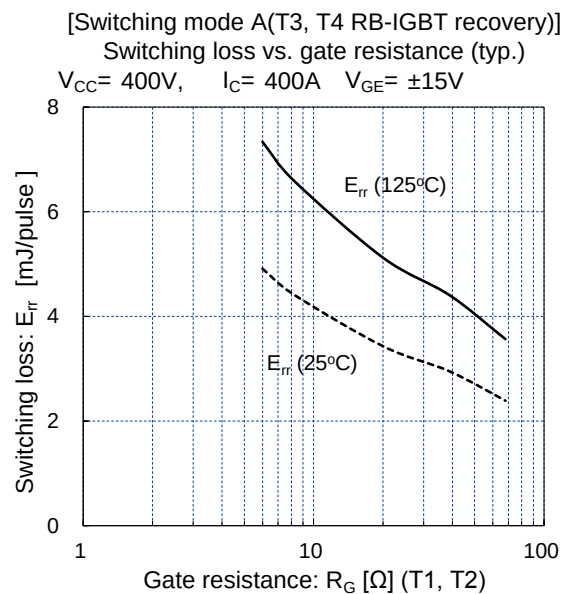
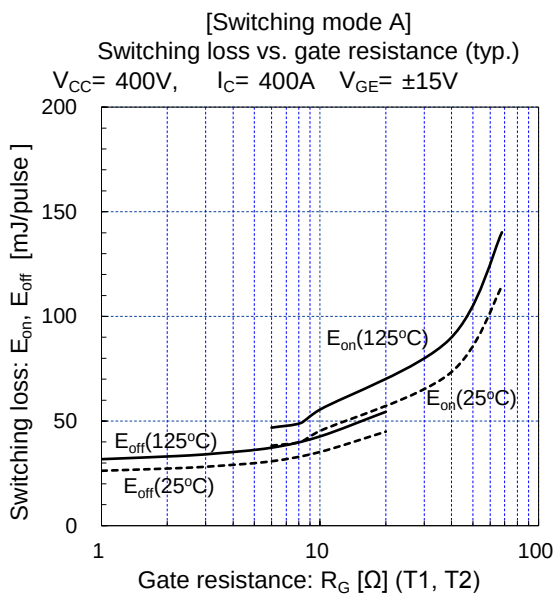
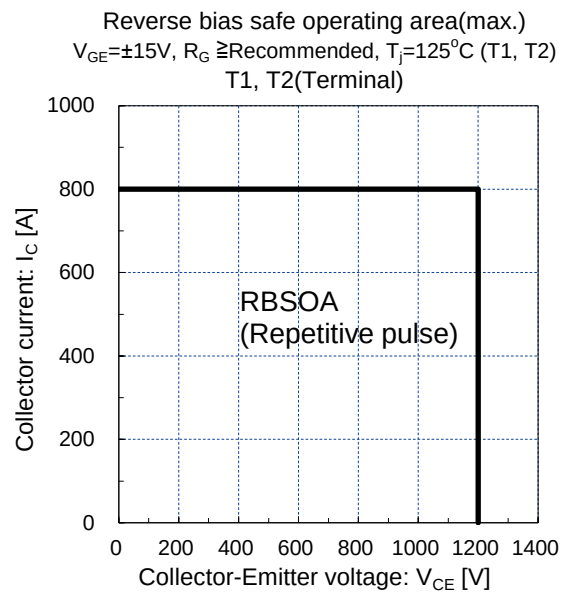
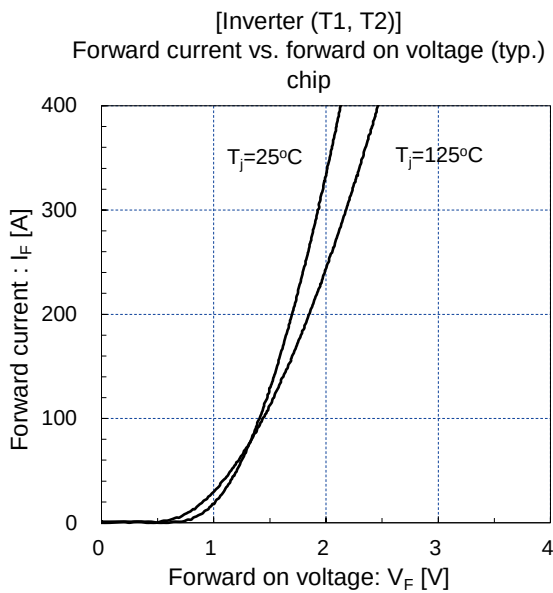
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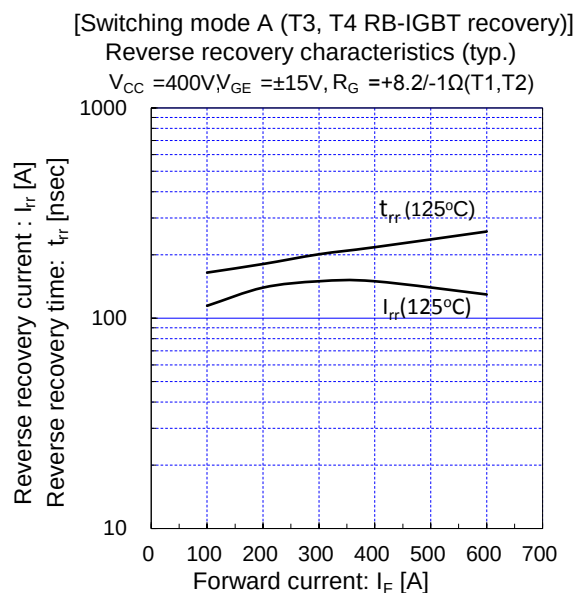
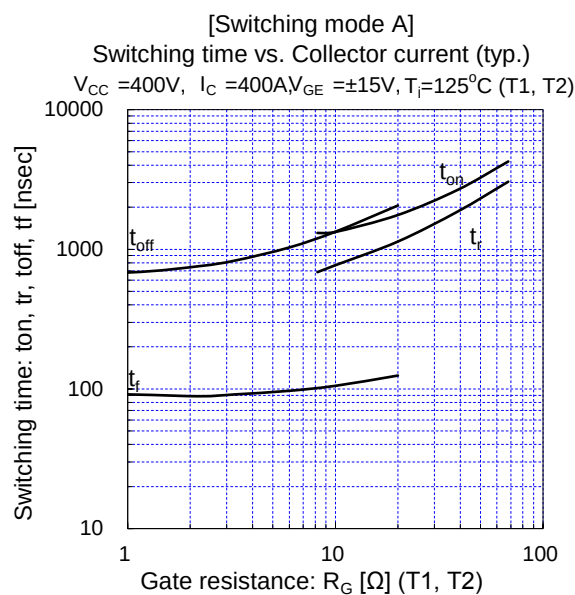
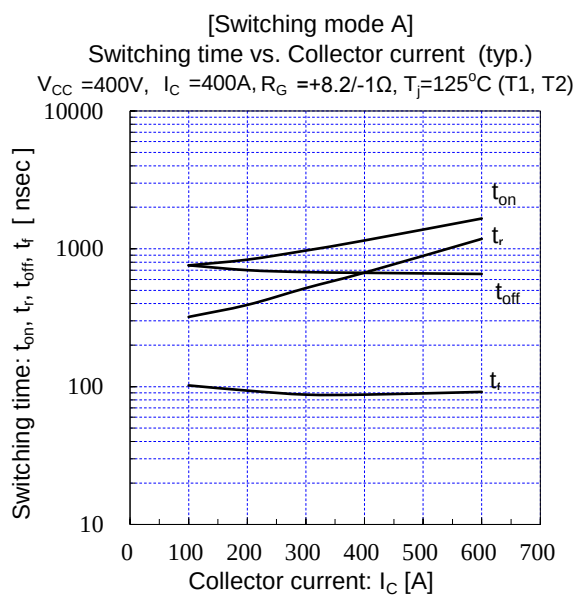
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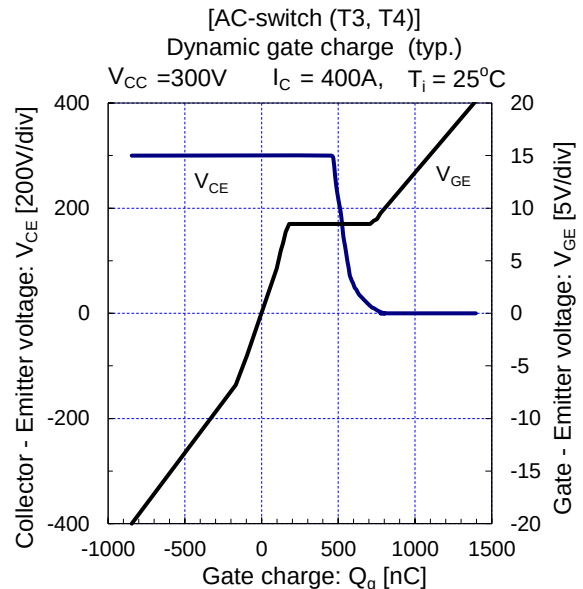
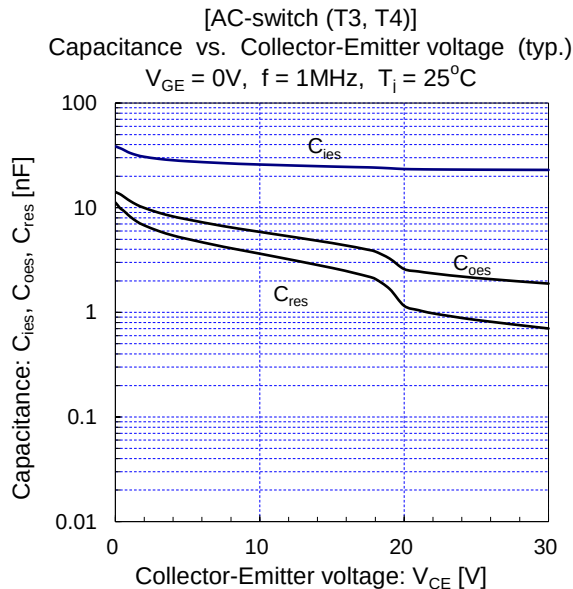
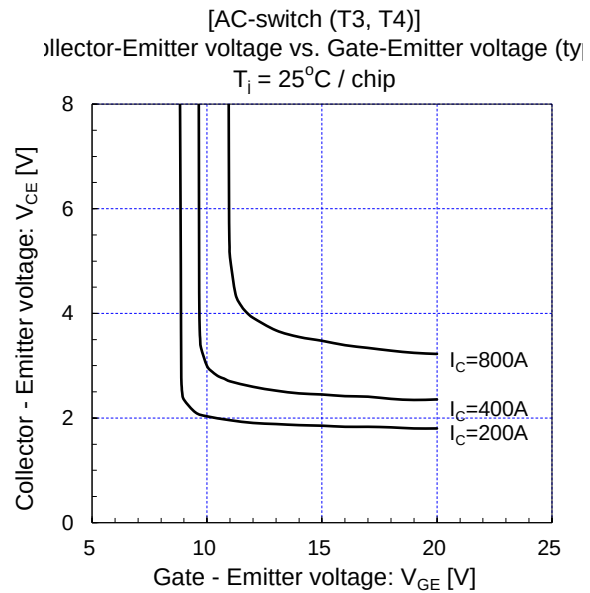
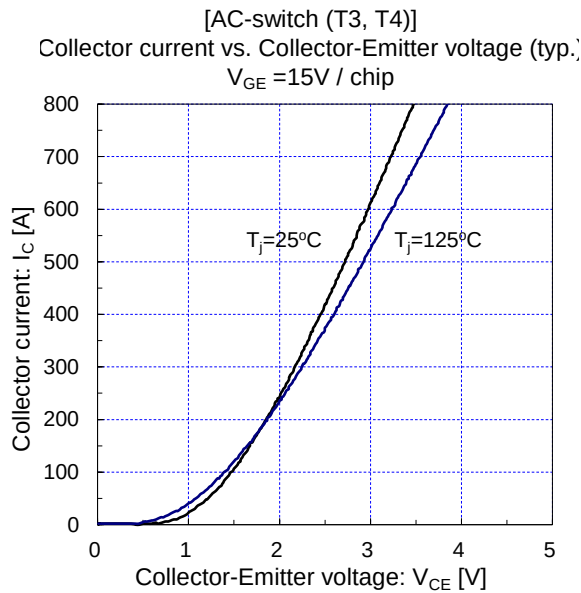
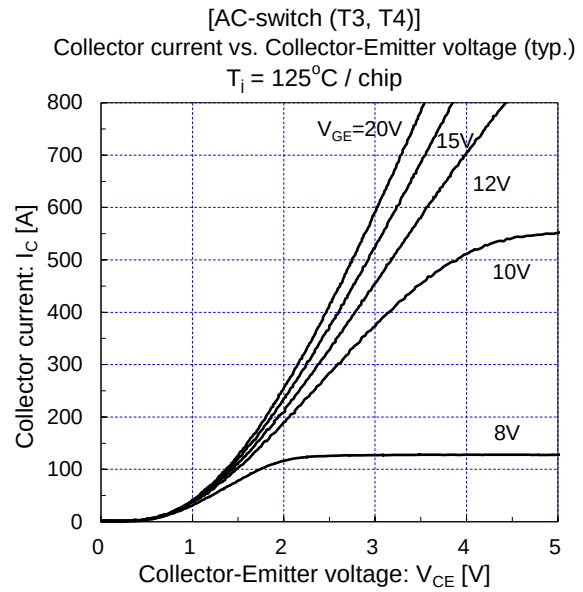
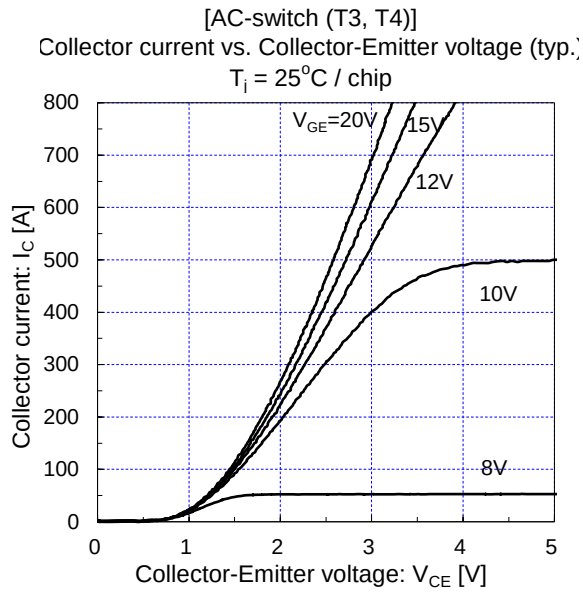
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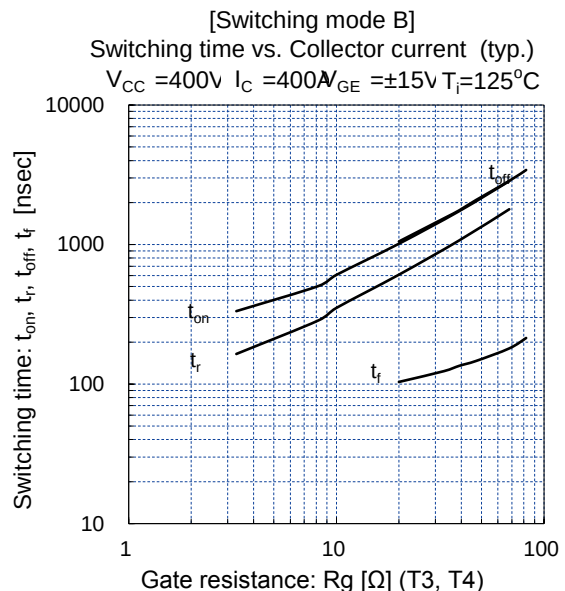
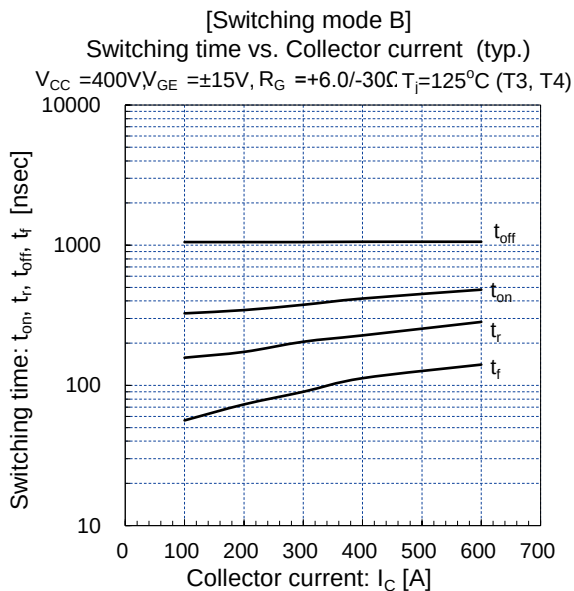
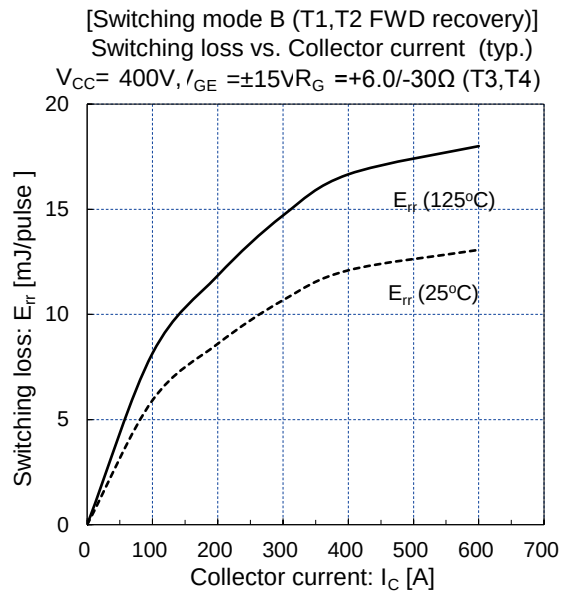
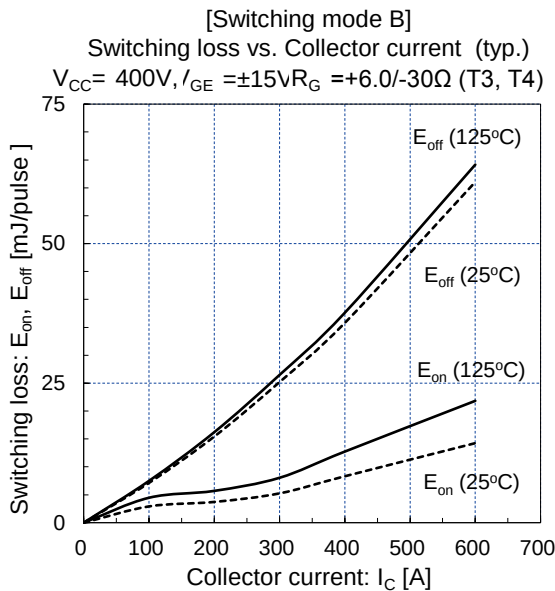
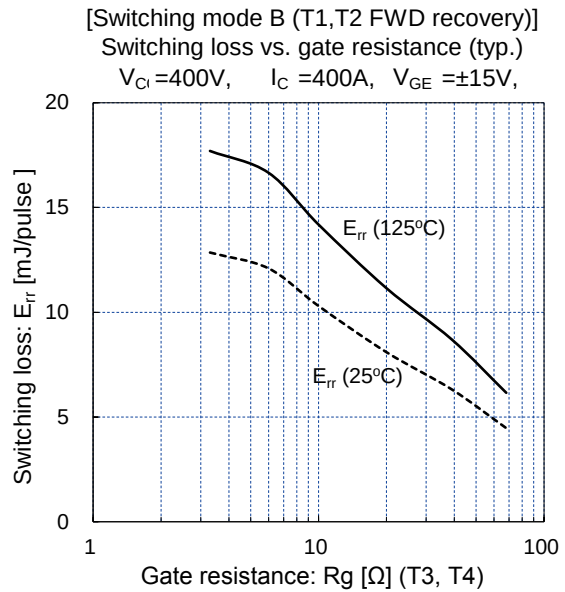
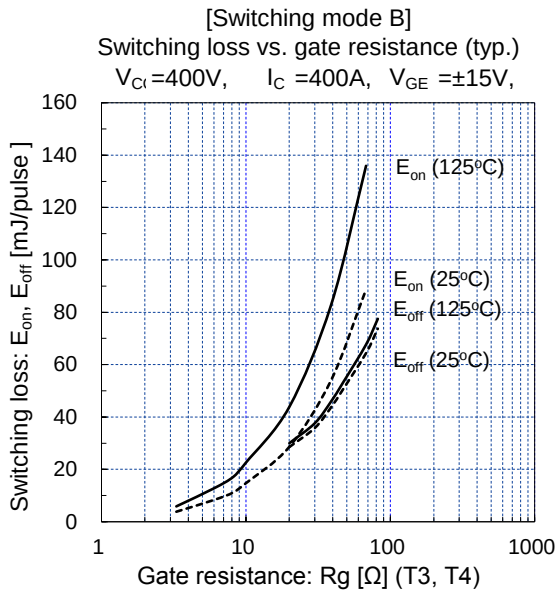
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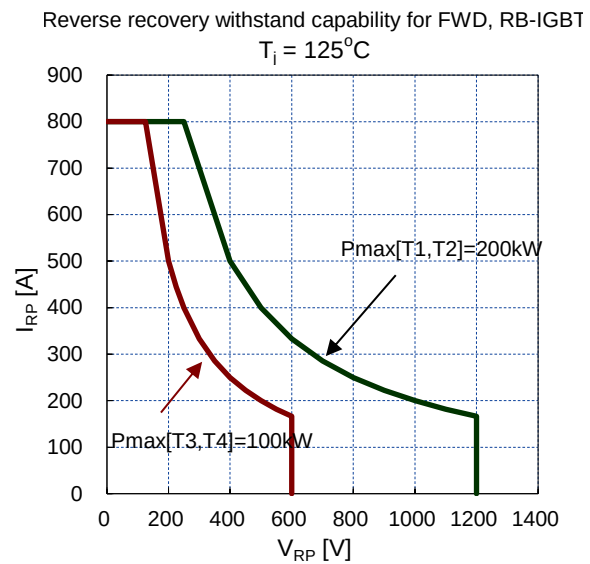
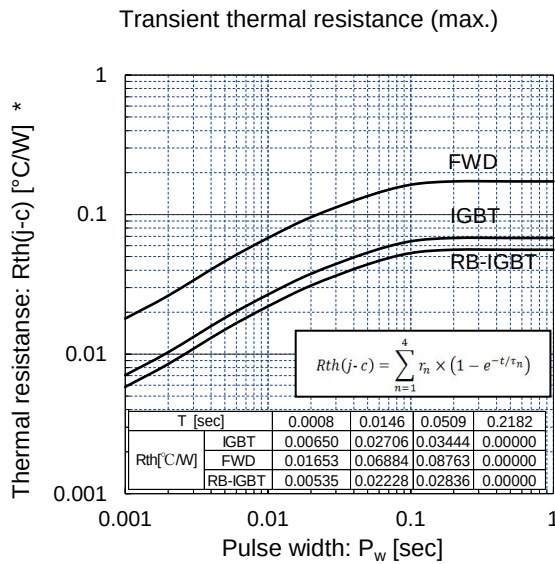
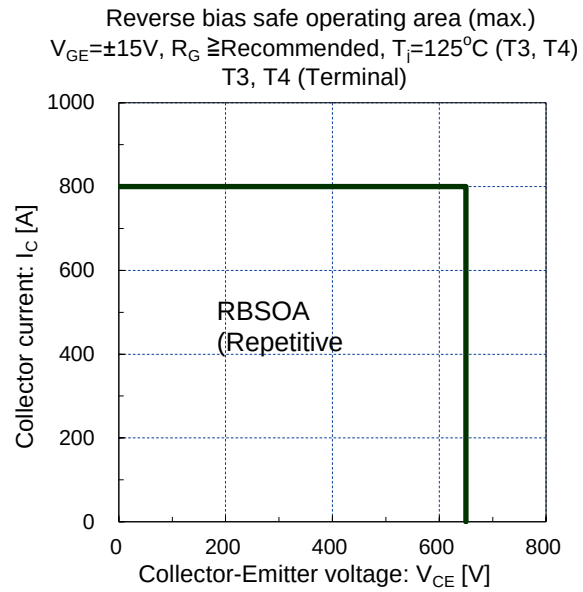
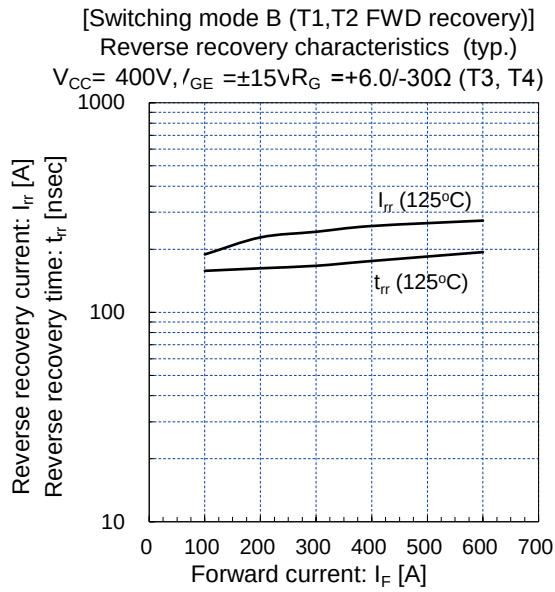
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