DFI75FB12P3D1

1200V/75A 6 Units IGBT Module

Description

The DFI75FB12P3D1 offer lower losses and higher energy for application such as motor drive、inverter and soft switching applications.

Features

- 1200V75 A, V_{CE} (sat)(typ.) =1.6V
- Lower losses and higher energy
- Excellent short-circuit capability

Applications

- Motor drive
- Inverter
- Welding machines
- UPS

Circuit diagram

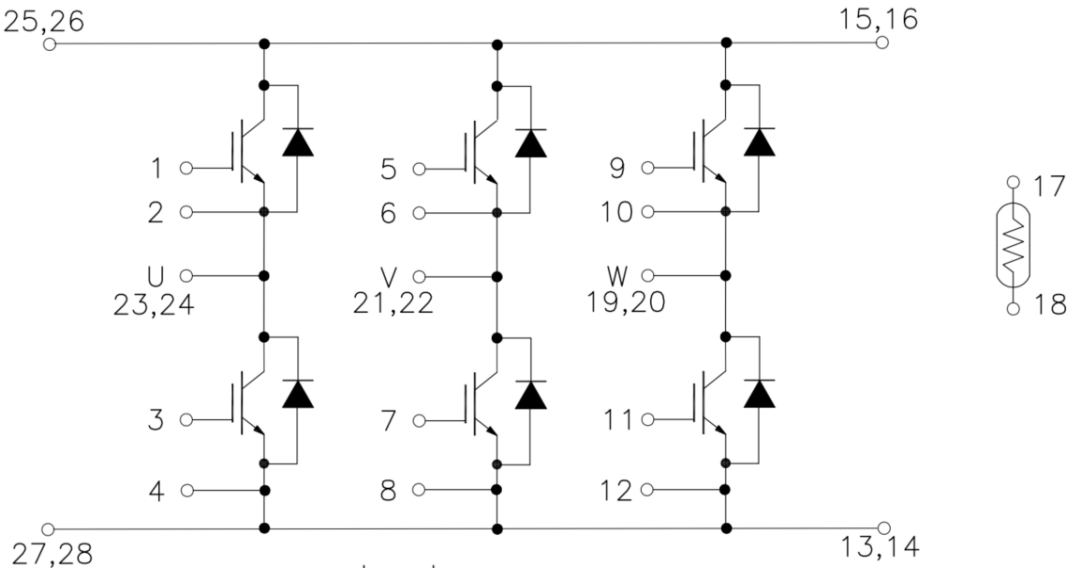


Figure 1. Out drawing & circuit diagram for DFI75FB12P3D1

Pin Configuration and Marking Information

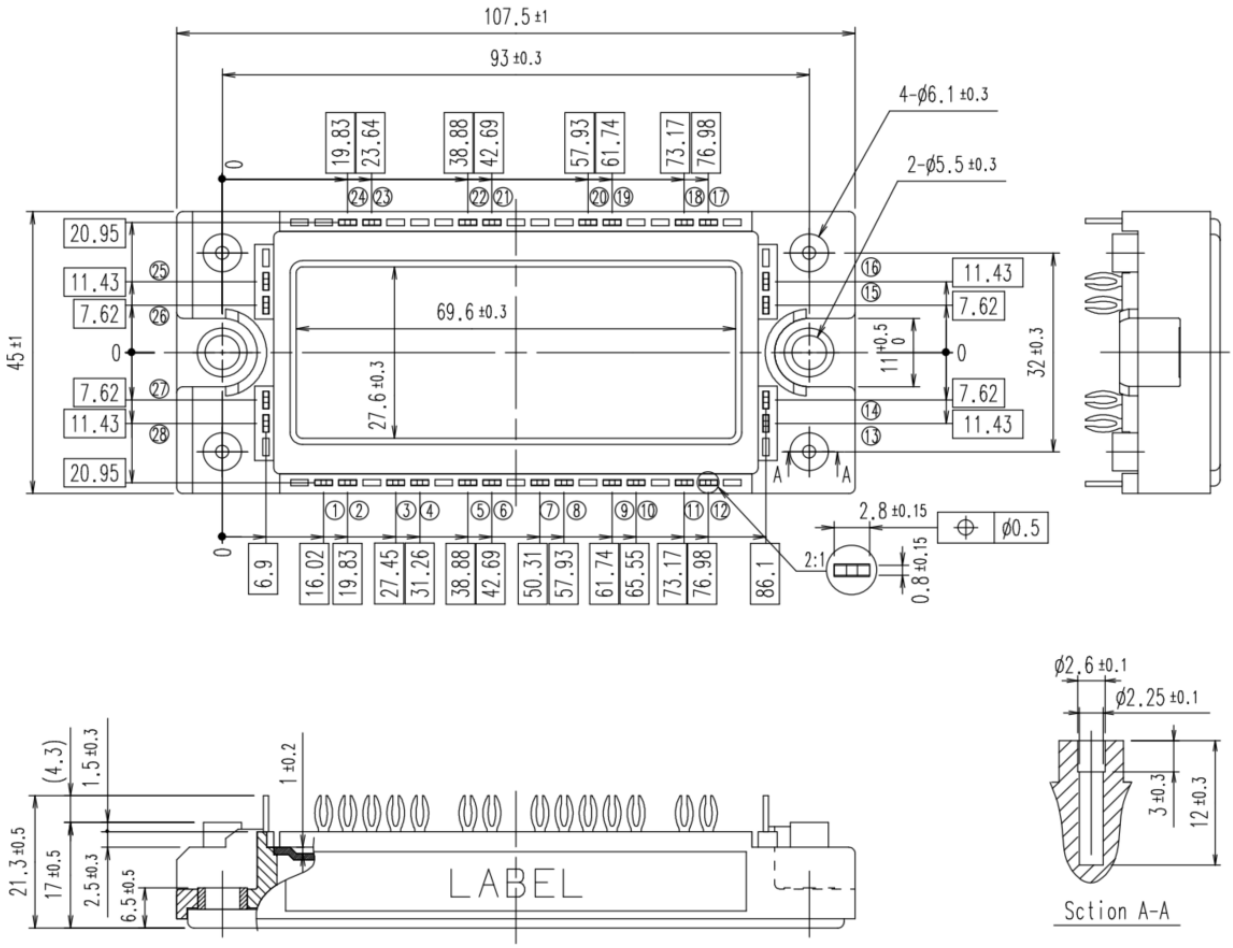


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t =1min	2.5	KV
CTI	-	>200	-
Module lead resistance, terminals – chip	T_C =25°C	0.8	mΩ
Mounting torque for module mounting	M5	3 to 6	Nm
Weight	-	175	g

Maximum Ratings (IGBT, Freewheeling Diode ,T_j =25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1200	V
V_{GES}	Gate-Emitter Voltage	C-E Short	±20V	V
I_C	DC Continuous Collector Current	T_C =100°C	75	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	150	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	500	W
I_F	Diode forward Current	-	75	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	150	A
I^2t	I^2t-value	V_R =0V, t_p =10ms, T_j =25°C (Diode)	2000	A^2s
t_{sc}	Short Circuit Withstand Time	V_{GE} =15V, V_{CE} =600V, T_j =150°C	10	us
T_{jmax}	Max junction temperature	-	175	°C
T_{jop}	Operating junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

NTC characteristics

Symbol	Parameter	Condition	Value			Unit
			Min.	Typ.	Max.	
R_{25}	Resistance	T_C =25°C	-	5	-	kΩ
ΔR/R	Deviation of R100	T_C =100°C, R_{100} =493Ω	5	-	5	%
P_{25}	Power dissipation	T_C =25°C	-	-	20	mW
$B_{25/50}$	B-value	R2 = R25 exp [$B_{25/50}$(1/T2 - 1/(298,15 K))]	-	3375	-	K
$B_{25/80}$	B-value	R2 = R25 exp [$B_{25/80}$(1/T2 - 1/(298,15 K))]	-	3411	-	K
$B_{25/100}$	B-value	R2 = R25 exp [$B_{25/100}$(1/T2 - 1/(298,15 K))]	-	3433	-	K

IGBT Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =75A, V_{GE} =15V	T_j =25°C	-	1.6	-	V
			T_j =125°C	-	1.8	-	V
			T_j =150°C	-	1.8	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	I_C =20mA, V_{CE} =V_{GE}		4.5	5.2	5.7	V
Q_G	Gate charge	V_{GE} = -15V to +15V		-	780	-	nC
R_{Gint}	Internal gate resistor	f=1M, Vpp=1V	T_j =25°C	-	2.5	-	Ω
C_{ies}	Input Capacitance	V_{CE} =25V, V_{GE} =0V, f =1MHz	T_j =25°C	-	7.2	-	nF
C_{oes}	Output Capacitance			-	1.1	-	nF
C_{res}	Reverse transfer Capacitance			-	0.6	-	nF
I_{CES}	Collector- Emitter Cut off Current	V_{CE} =1200V, V_{GE} =0V	T_j =25°C	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} =20V, V_{CE} =0V	T_j =25°C	-	-	300	nA
$t_{d(on)}$	Turn-on delay time	V_{CC} =600V, I_C =75A, V_{GE} =+15V/-8V, R_{Gon} = R_{Goff} =5.1Ω, Inductive load	T_j =25°C	-	106	-	ns
			T_j =150°C	-	108	-	
t_r	Rise time		T_j =25°C	-	40	-	ns
			T_j =150°C	-	38	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	692	-	ns
			T_j =150°C	-	782	-	
t_f	Fall time		T_j =25°C	-	246	-	ns
			T_j=150°C	-	466	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	3.6	-	mJ
			T_j =150°C	-	6.2	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	7.0	-	mJ
			T_j =150°C	-	11.4	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-	-	0.24	°C /W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.05	-	°C /W

Freewheeling Diode Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
V_F	Diode Forward Voltage	I_F =75A, V_{GE} =0V	T_j =25°C	-	1.4	-	V
			T_j =150°C	-	1.3	-	
t_{rr}	Diode Reverse Recovery Time	(Switch side) V_{CC} =600V, I_C =75A V_{GE} =+15V/-8V R_{Gon} = R_{Goff} =5.1Ω (FRD side) V_{rr}=600V, I_F=75A V_{GE}=+15V/-8V Inductive load switching operation	T_j =25°C		454		ns
			T_j =150°C		782		
I_{RM}	Peak reverse recovery Current		T_j =25°C	-	50	-	A
			T_j =150°C	-	60	-	
Q_{rr}	Recovered charge		T_j=25°C	-	14.7	-	uC
			T_j =150°C	-	29.8	-	
E_{rr}	Reverse recovered energy		T_j =25°C	-	6.9	-	mJ
			T_j =150°C	-	13.5	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)			-	-	0.45	°C/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.05	-	°C/W

Test Conditions

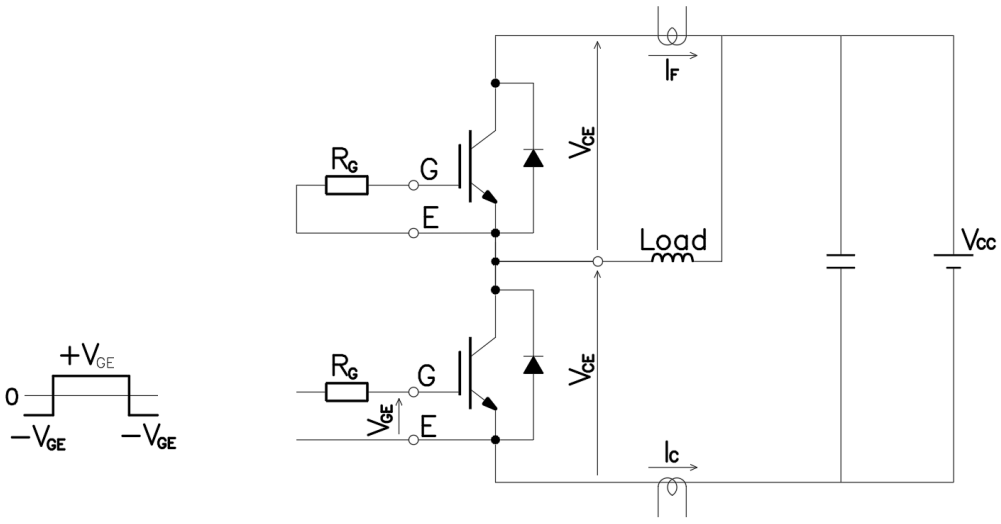


Figure 3. Switching time measure circuit

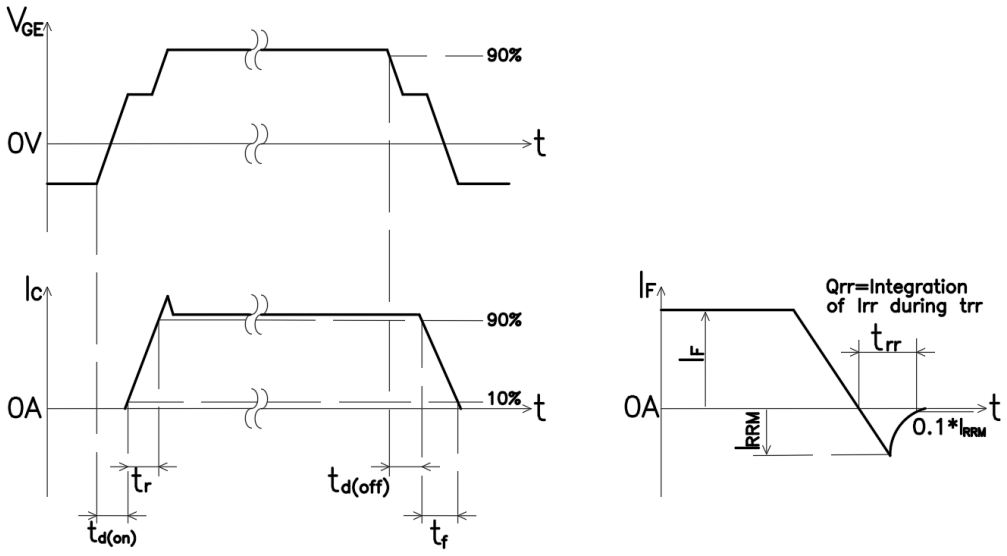


Figure 4. Switching time definition

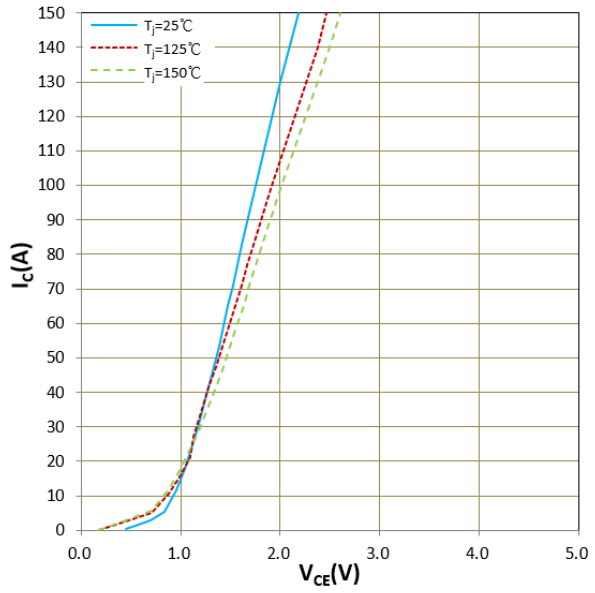


Figure 5. Ic vs V_{CE}
V_{GE} =15V

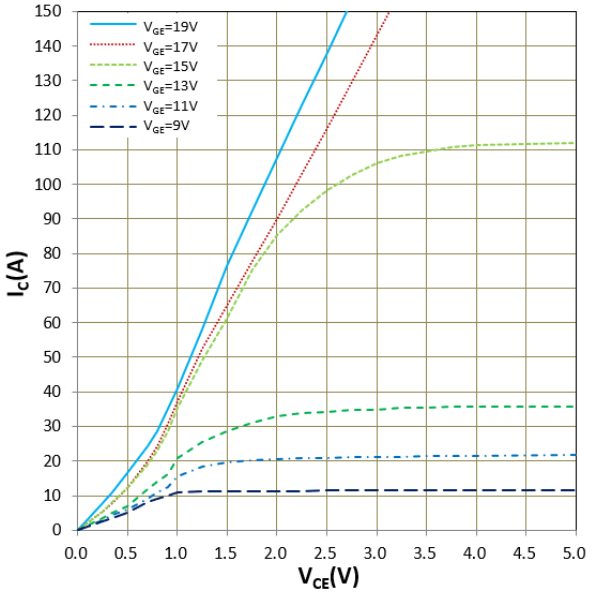


Figure 6. Ic vs V_{CE}
T_j =150°C

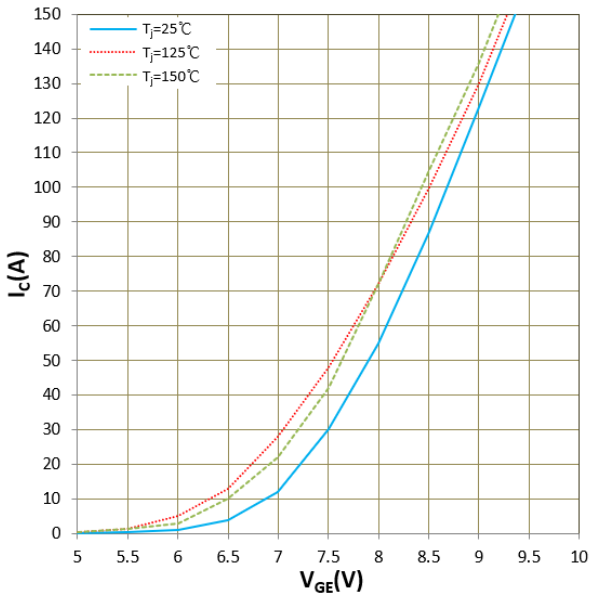


Figure 7. Ic vs V_{GE}
V_{CE} =20V

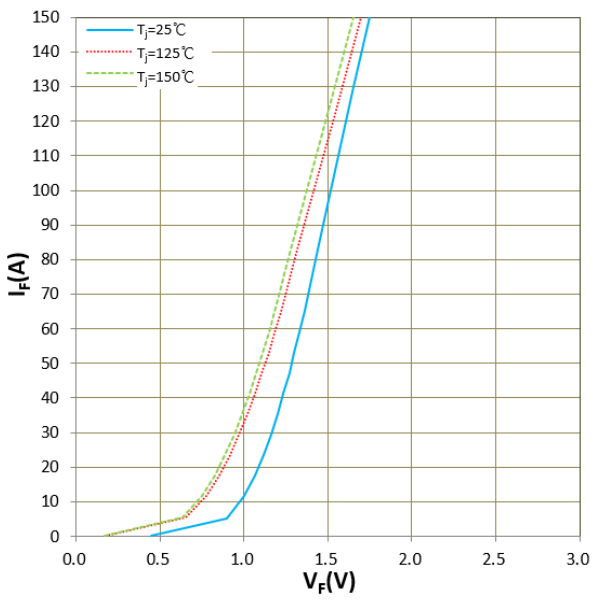


Figure 8. I_F vs V_F

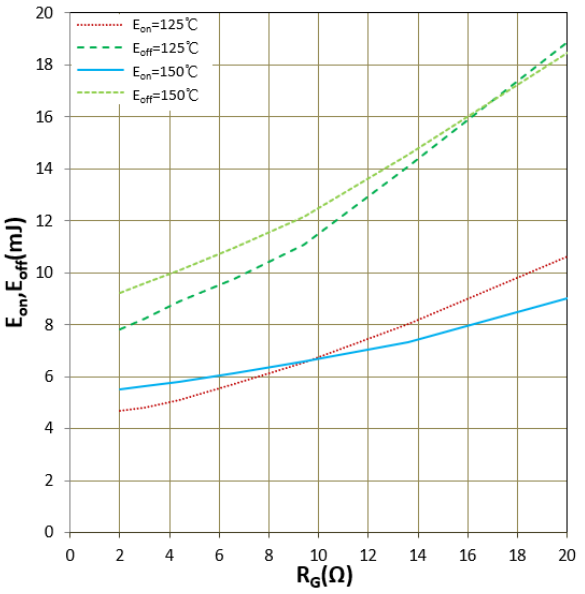


Figure 9. E_{on}, E_{off} vs R_G(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C = 75A
Inductive Load

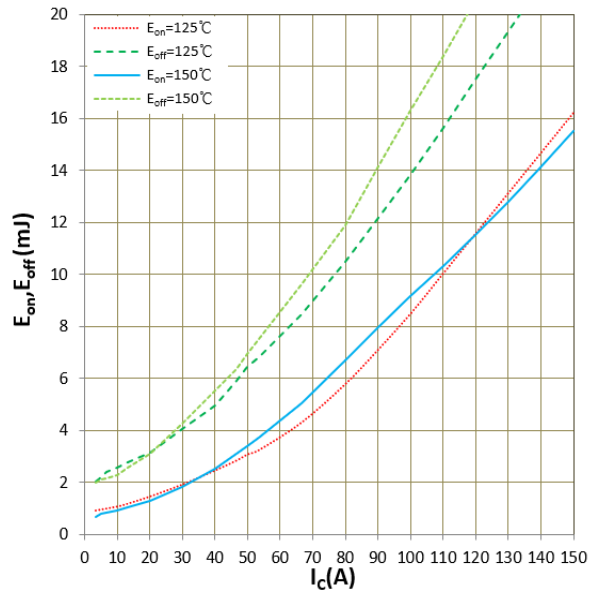


Figure 10 E_{on}, E_{off} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-8V, R_{Gon} = R_{Goff} =5.1Ω
Inductive Load

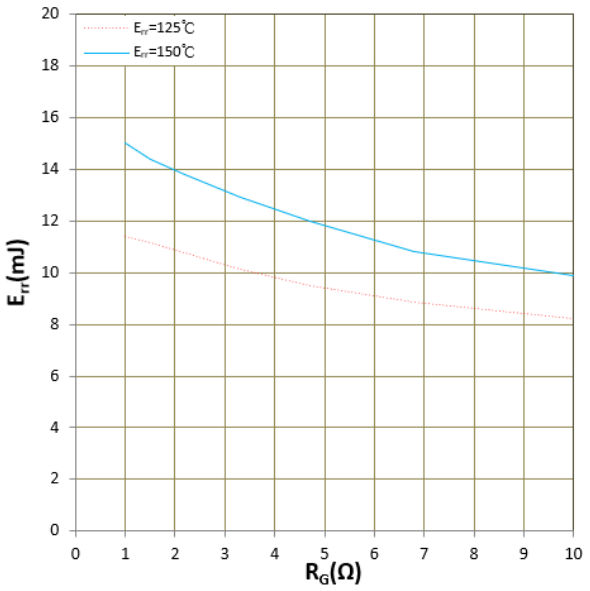


Figure 11. Err vs R_G(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_F =75A
Inductive Load

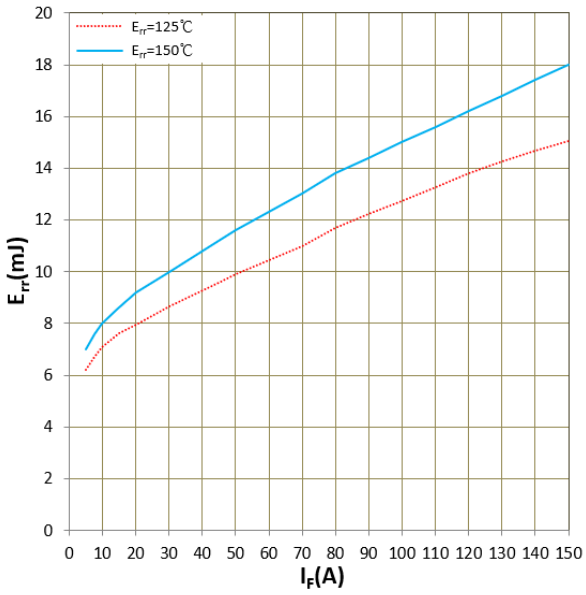
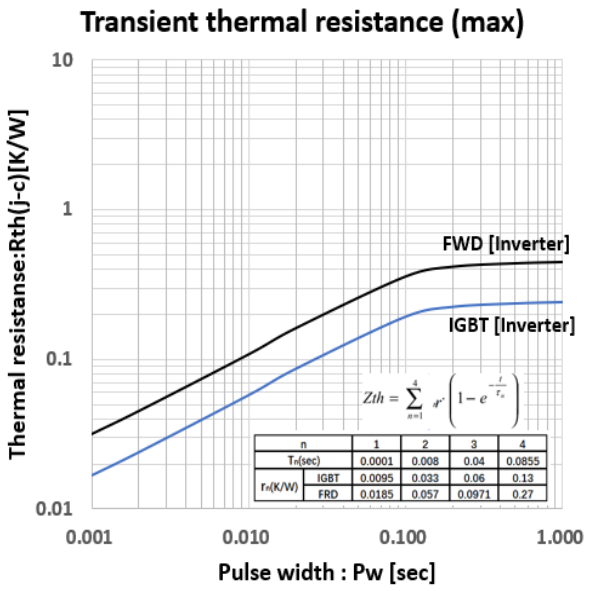


Figure 12. E_{rr} vs I_F(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, R_{Gon} = R_{Goff} =5.1Ω
Inductive Load



n		1	2	3	4
Tn(sec)		0.0001	0.008	0.04	0.0855
rn(K/W)	IGBT	0.0095	0.033	0.06	0.13
	FRD	0.0185	0.057	0.0971	0.27

Figure 13. Transient thermal resistance

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