

Description

The DFI50FB12P3H2 offer lower losses and higher energy for application such as motor drive、inverter and soft switching applications.



Features

- 1200V50A, $V_{CE(sat)(typ.)} = 1.65V$
- Lower losses and higher energy
- Excellent short-circuit capability

Applications

- Motor drive
- Inverter
- Welding machines
- UPS

Circuit diagram

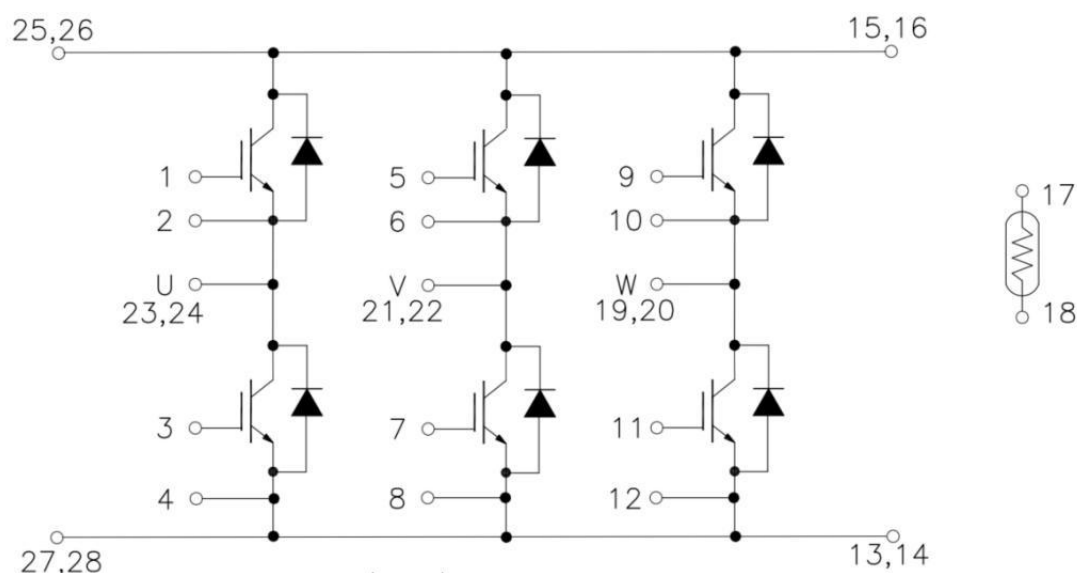


Figure 1. Out drawing & circuit diagram for DFI50FB12P3H2

Pin Configuration and Marking Information

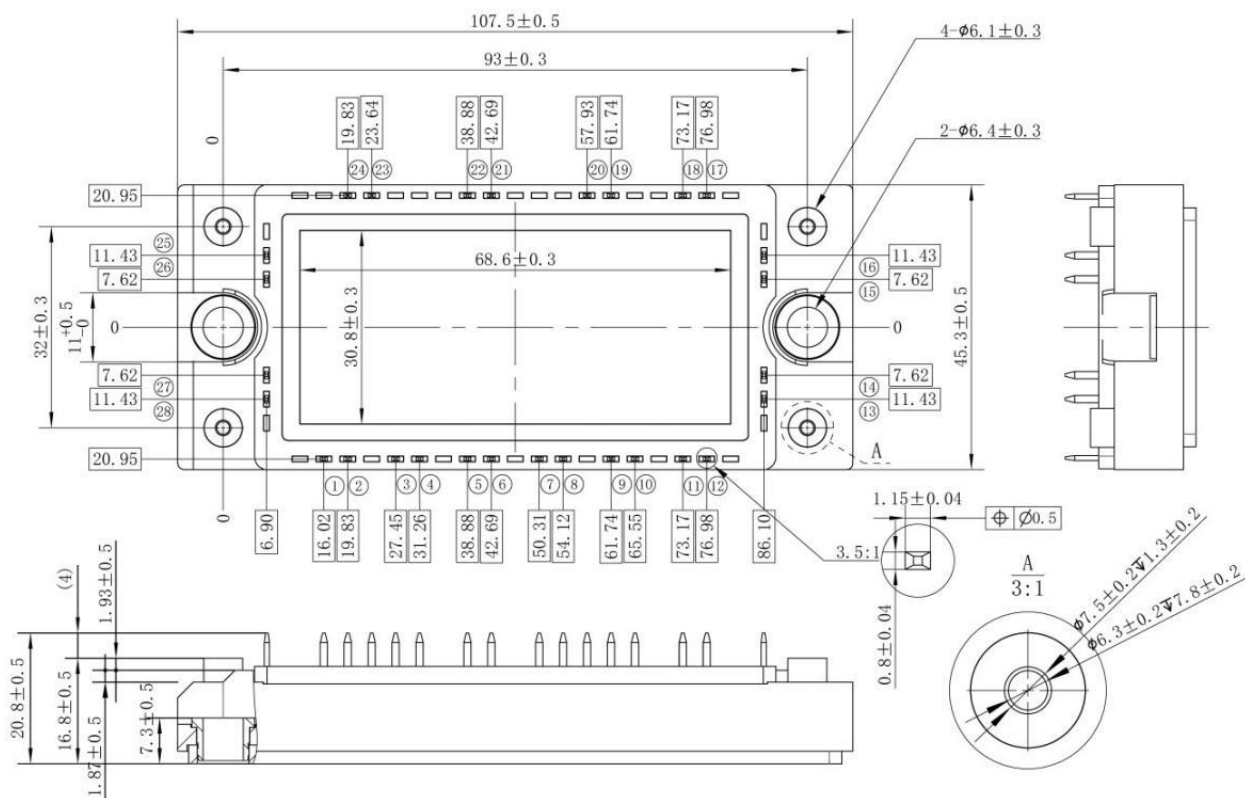


Figure 2. Pin configuration

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, $T_j=25^{\circ}\text{C}$ 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	$\pm 20\text{V}$	V
I_C	DC Continuous Collector Current	$T_C = 110^{\circ}\text{C}$	50	A
I_{CM}	Pulse Collector Current	$t_p = 1\text{ms}$, Note1	100	A
P_C	Maximum Power Dissipation	$T_C = 25^{\circ}\text{C}$, $T_j = 175^{\circ}\text{C}$ (IGBT)	357	W
I_F	Diode forward Current	-	50	A
I_{FRM}	Repetitive peak forward Current	$t_p = 1\text{ms}$, Note1	100	A
t_{sc}	Short Circuit Withstand Time	$V_{GE} = 15\text{V}$, $V_{CE} = 600\text{V}$, $T_j = 150^{\circ}\text{C}$	10	μs
T_{jmax}	Max junction temperature	-	175	$^{\circ}\text{C}$
T_{jop}	Operating junction temperature	-	-40 to 150	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^{\circ}\text{C}$

Note1: Pulse width limited by maximum junction temperature

NTC characteristics

Symbol	Parameter	Condition	Value			Unit
			Min.	Typ.	Max.	
R_{25}	Resistance	$T_C = 25^{\circ}\text{C}$	-	5	-	$\text{k}\Omega$
$\Delta R/R$	Deviation of R_{100}	$T_C = 100^{\circ}\text{C}$, $R_{100} = 493\Omega$	-5	-	5	%
P_{25}	Power dissipation	$T_C = 25^{\circ}\text{C}$	-	-	20	mW
$B_{25/50}$	B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$	-	3375	-	K
$B_{25/80}$	B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$	-	3411	-	K
$B_{25/100}$	B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$	-	3433	-	K

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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 =50A V _{GE} =15V	T _j =25°C	-	1.65	-	V
			T _j =125°C	-	1.95	-	V
			T _j =150°C	-	2.00	-	V
V _{GE(th)}	Gate-Emitter threshold Voltage	I _C =2.8mA, V _{CE} =V _{GE}		5.0	5.8	6.5	V
Q _G	Gate charge	V _{GE} = -15V to +15V		-	320	-	nC
R _{Gint}	Internal gate resistor	f=1M	T _j =25°C	-	0	-	Ω
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V f=1MHz	T _j =25°C	-	3.50	-	nF
C _{oes}	Output Capacitance			-	0.45	-	nF
C _{res}	Reverse transfer Capacitance			-	0.28	-	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	-	-	200	nA
t _{d(on)}	Turn-on delay time	V _{CC} =600V I _C =50A V _{GE} =+15V/-8V R _{Gon} = R _{Goff} =15Ω Inductive load	T _j =25°C	-	72	-	ns
			T _j =125°C	-	64	-	
			T _j =150°C	-	64	-	
t _r	Rise time		T _j =25°C	-	20	-	ns
			T _j =125°C	-	24	-	
			T _j =150°C	-	26	-	
t _{d(off)}	Turn-off delay time		T _j =25°C	-	147	-	ns
			T _j =125°C	-	155	-	
			T _j =150°C	-	164	-	
t _f	Fall time		T _j =25°C	-	279	-	ns
			T _j =125°C	-	297	-	
			T _j =150°C	-	385	-	
E _{on}	Turn-on power dissipation		T _j =25°C	-	2.59	-	mJ
			T _j =125°C	-	3.91	-	

			T _j =150°C	-	4.13	-	mJ
E _{off}	Turn-off power dissipation		T _j =25°C	-	4.20	-	
			T _j =125°C	-	6.06	-	
			T _j =150°C	-	6.27	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT)			-	0.42	-	°C /W
R _{th(c-s)}	Thermal Resistance, Case to sink (Conductive Grease applied) , Note1			-	0.20	-	°C /W

Note1: Assumes Thermal Conductivity of grease is 2.8 W/m · K and thickness is 50um.

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 =50A, V _{GE} =0V	T _J =25°C	-	1.63	-	V	
			T _J =125°C	-	1.50	-		
			T _J =150°C	-	1.45	-		
t _{rr}	Diode Reverse Recovery Time	(Switch side) V _{CC} =600V, I _C =50A V _{GE} =+15V/-8V R _{Gon} = R _{Goff} =15Ω (FRD side) V _π =600V, I _F =50A V _{GE} =+15V/-8V Inductive load switching operation	T _J =25°C		245		ns	
			T _J =125°C	-	392	-		
			T _J =150°C		434			
I _{RM}	Peak reverse recovery Current		T _J =25°C	-	62	-	A	
			T _J =125°C	-	65	-		
			T _J =150°C	-	67	-		
Q _{rr}	Recovered charge		T _J =25°C	-	5.03	-	uC	
			T _J =125°C	-	9.44	-		
			T _J =150°C	-	10.98	-		
E _{rr}	Reverse recovered energy		T _J =25°C	-	2.17	-	mJ	
			T _J =125°C	-	4.19	-		
			T _J =150°C	-	4.86	-		
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)			-	0.60	-	°C/W	
R _{th(c-s)}	Thermal Resistance, Case to sink (Conductive Grease applied) , Note1			-	0.30	-	°C/W	

Note1: Assumes Thermal Conductivity of grease is 2.8 W/m · K and thickness is 50um.

Test Conditions

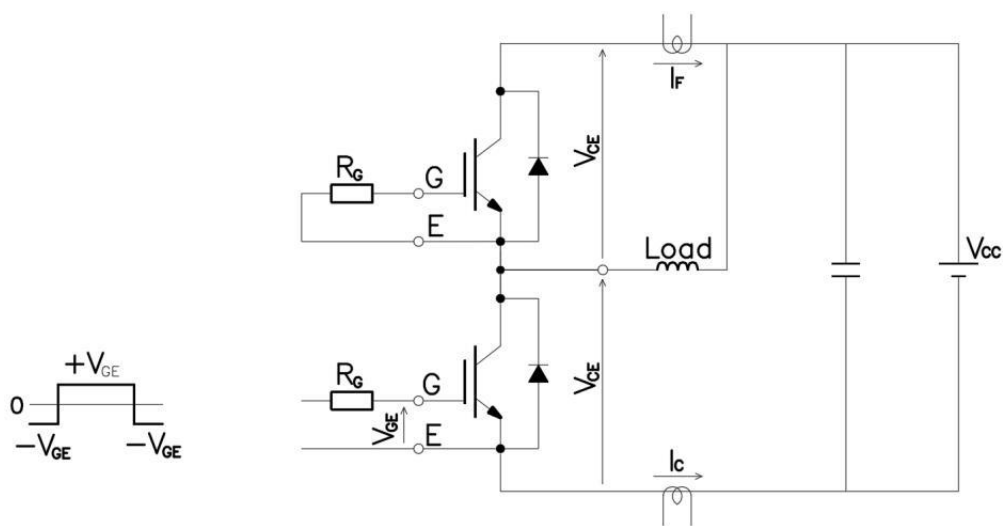


Figure 3. Switching time measure circuit

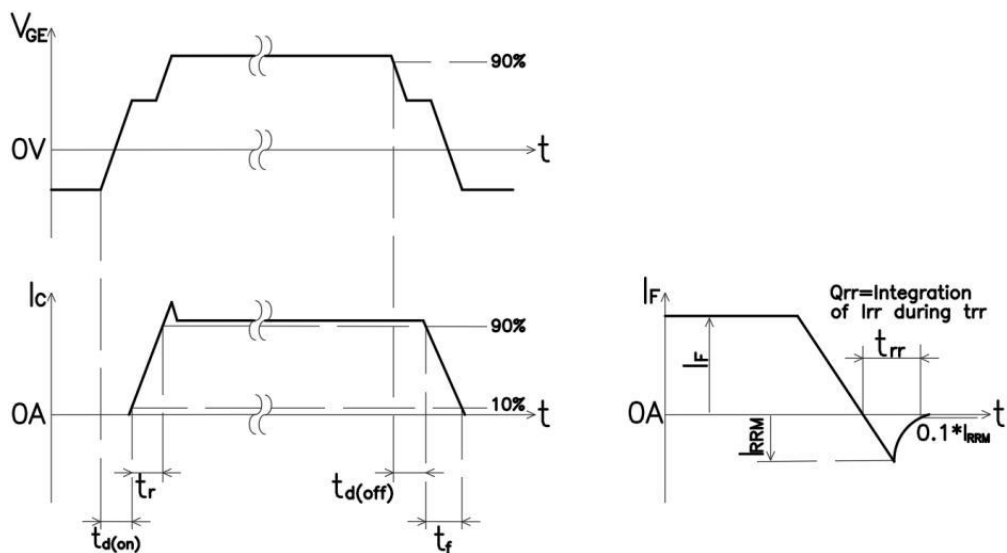


Figure 4. Switching time definition

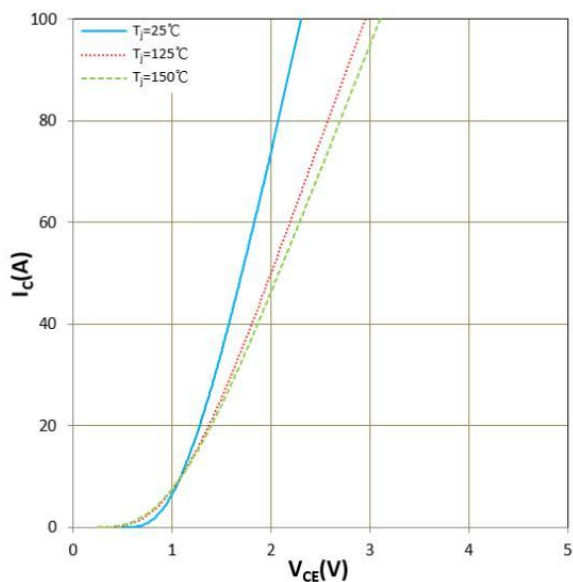


Figure 5. I_C vs V_{CE}
 $V_{GE}=15V$

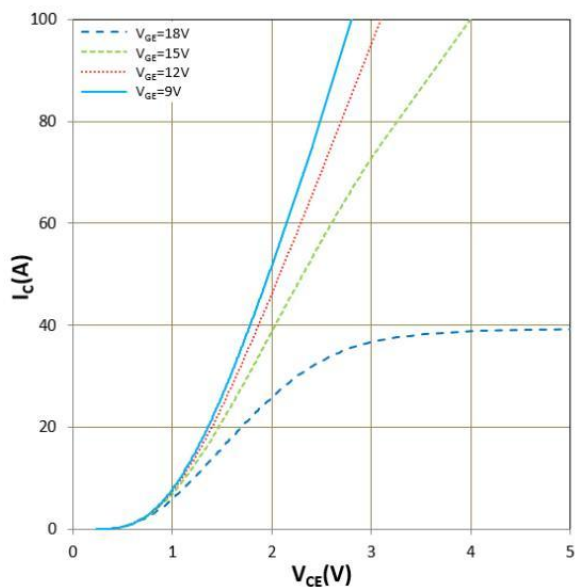


Figure 6. I_C vs V_{CE}
 $T_j=150^\circ C$

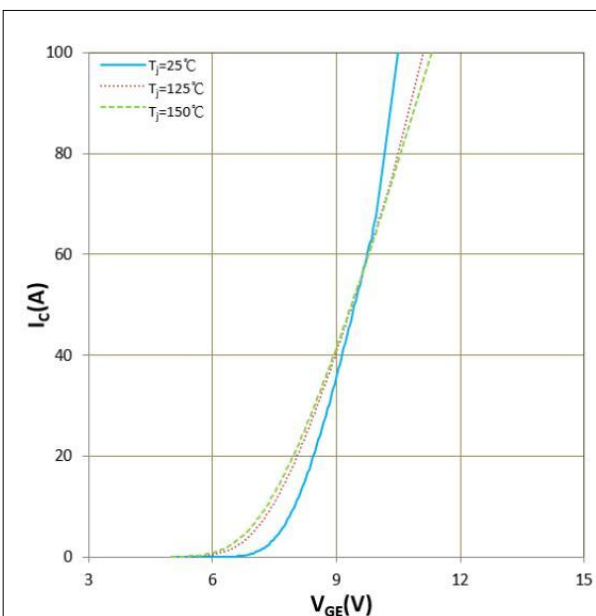


Figure 7. I_C vs V_{GE}
 $V_{CE} = 20\text{V}$

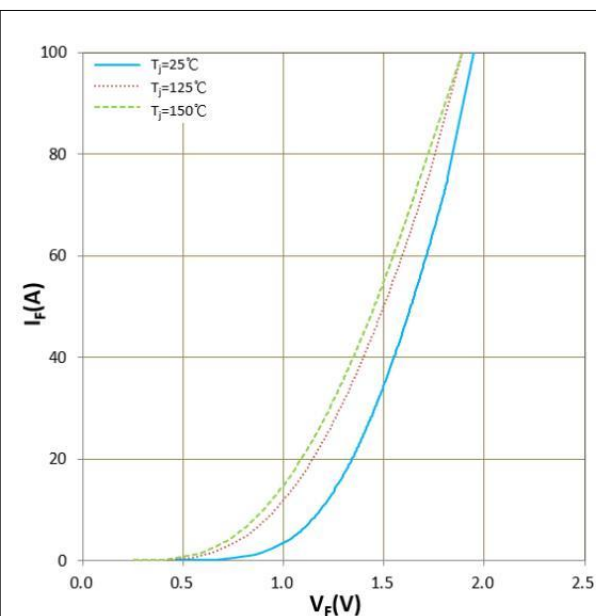


Figure 8. I_F vs V_F

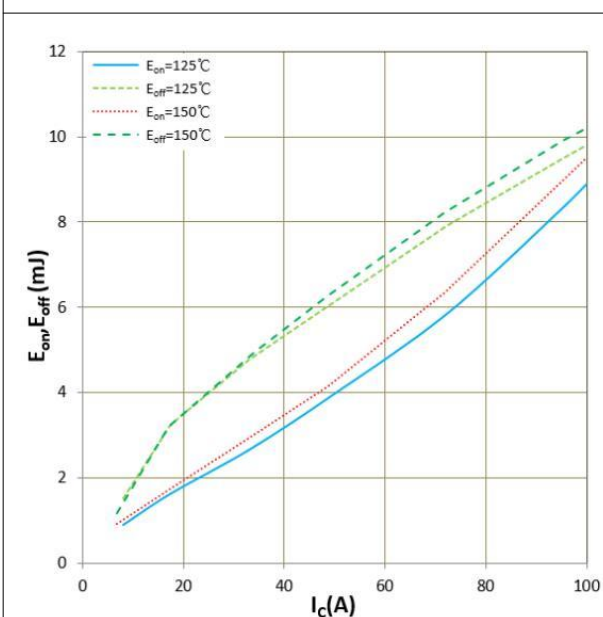


Figure 9. E_{on} , E_{off} vs I_C (Typ)
 $V_{CC} = 600\text{V}$, $V_{GE} = +15\text{V}/-8\text{V}$, $R_{Gon} = R_{Goff} = 10\Omega$
Inductive Load

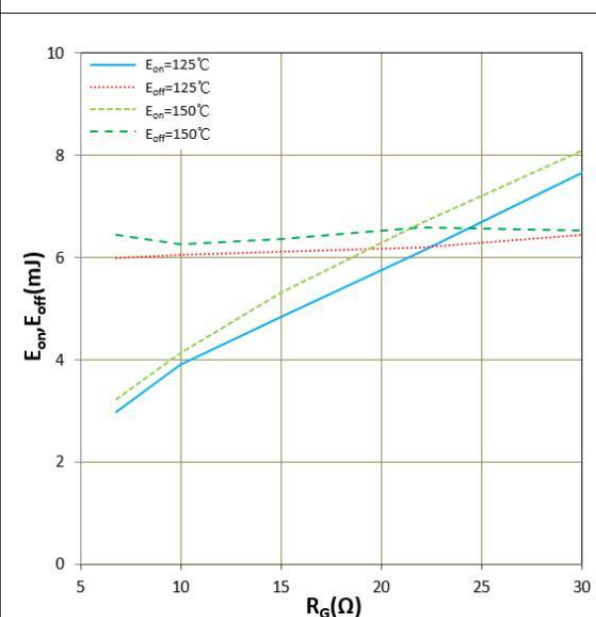
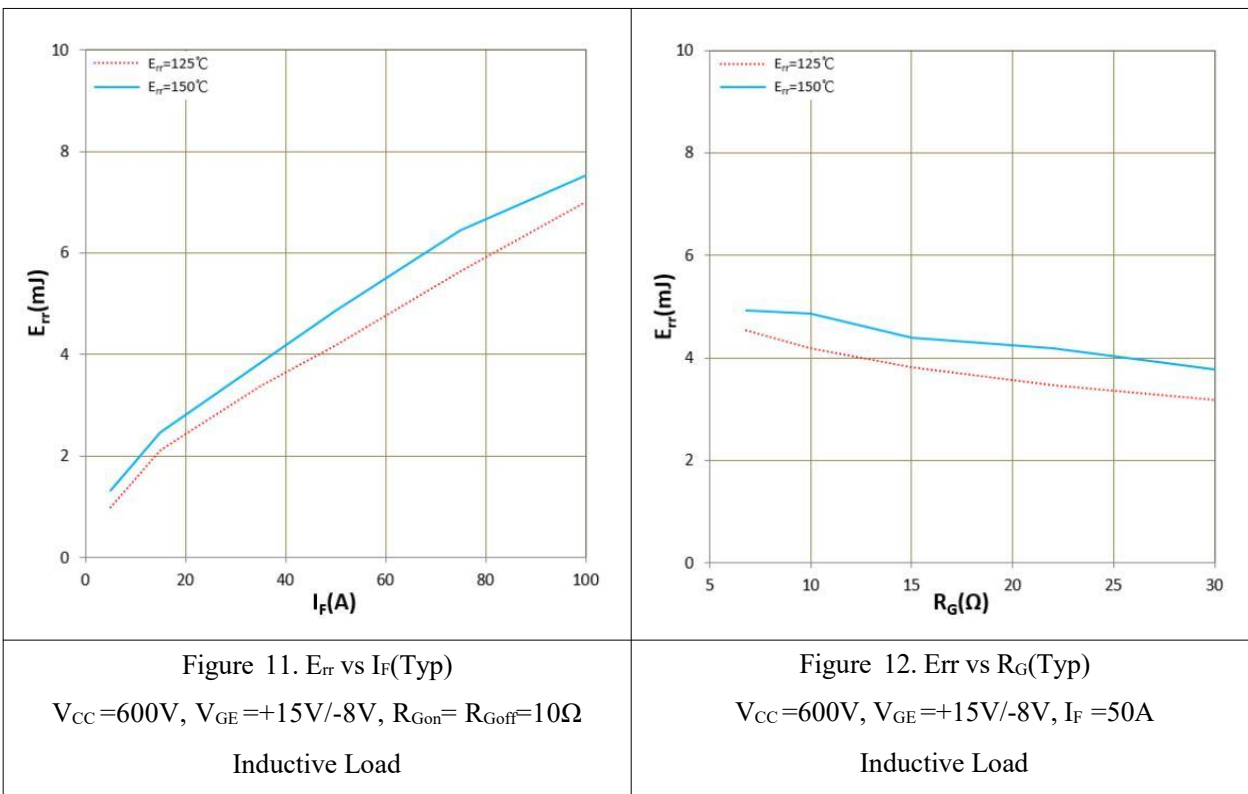


Figure 10. E_{on} , E_{off} vs R_G (Typ)
 $V_{CC} = 600\text{V}$, $V_{GE} = +15\text{V}/-8\text{V}$, $I_C = 50\text{A}$
Inductive Load



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This product data sheet describes the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively under the terms and conditions of the supply agreement. There will be no guarantee or of any kind for the product and its characteristics.

The data contained in this document is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the product's suitability for the intended application and the completeness of the product data concerning such application.

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