

### Description

The DFI300HF12I4ME1 is a Half Bridge IGBT Power Module. It integrates high performance IGBT chips designed for the applications such as High Power supply and Motor control.



### Features

- Blocking voltage:1200V
- Low saturation voltage  $V_{CE(sat)}$
- Low Switching Losses
- Thermistor inside

### Applications

- High Power Switching Applications
- Motor Drives
- Solar inverter Systems
- Wind Turbines

### Circuit diagram

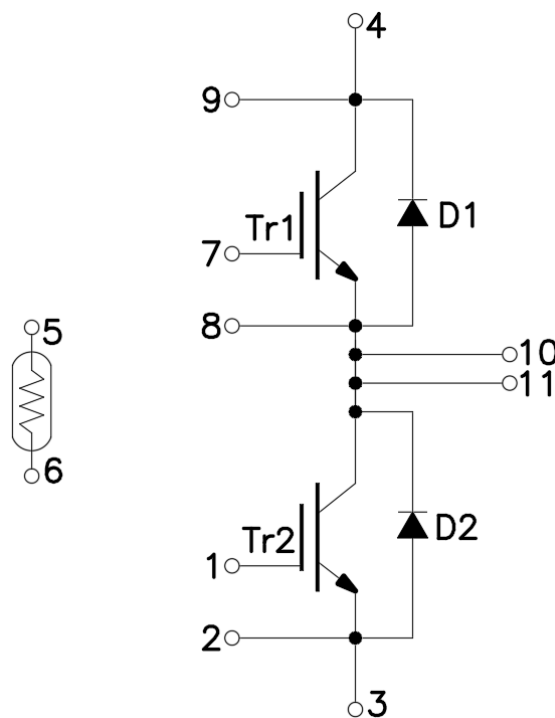


Figure 1. Out drawing & circuit diagram for DFI300HF12I4ME1

### Pin Configuration and Marking Information

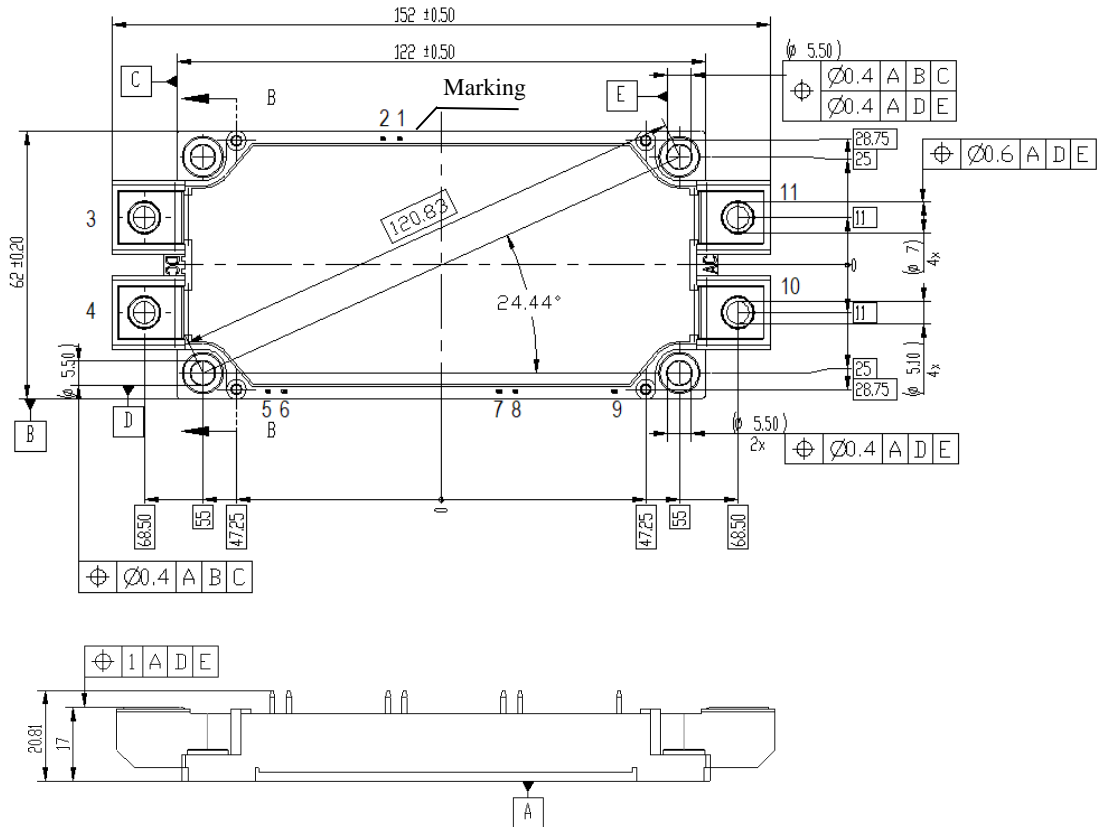


Figure 2. Pin configuration

### Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, $f = 50\text{Hz}$ , $t = 1\text{min}$	3.4	KV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	14.5 13	mm
Clearance	terminal to heatsink terminal to terminal	13 10.5	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	$T_c = 25^\circ\text{C}$	0.99	$\text{m}\Omega$
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	350	g

### Maximum Ratings (T<sub>j</sub>=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CES</sub>	Collector-Emitter Voltage	G-E Short	1200	V
V <sub>GES</sub>	Gate-Emitter Voltage	C-E Short	±20	V
I <sub>C</sub>	DC Continuous Collector Current	T <sub>C</sub> =100°C	300	A
I <sub>CM</sub>	Pulse Collector Current	t <sub>p</sub> =1ms, Note1	600	A
P <sub>C</sub>	Maximum Power Dissipation	T <sub>C</sub> =25°C, T <sub>j</sub> =175°C(IGBT)	1364	W
I <sub>F</sub>	Diode forward Current	-	300	A
I <sub>FRM</sub>	Repetitive peak forward Current	t <sub>p</sub> =1ms, Note1	600	A
T <sub>j</sub>	junction temperature	-	-40 to 175	°C
T <sub>stg</sub>	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 <sub>25</sub>	Resistance	T <sub>C</sub> =25°C	-	5	-	kΩ
ΔR/R	Deviation of R100	T <sub>C</sub> =100°C, R <sub>100</sub> =493Ω	-5	-	5	%
P <sub>25</sub>	Power dissipation	T <sub>C</sub> =25°C	-	-	20	mW
B <sub>25/50</sub>	B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$	-	3375	-	K
B <sub>25/80</sub>	B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$	-	3411	-	K
B <sub>25/100</sub>	B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$	-	3433	-	K

### IGBT Electrical characteristics (T<sub>j</sub>=25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
V <sub>CE(sat)</sub> (Chip)	Collector-Emitter Saturation Voltage	I <sub>C</sub> =300A V <sub>GE</sub> =15V	T <sub>j</sub> =25°C	-	1.65	1.95	V
			T <sub>j</sub> =125°C	-	1.85	-	V
			T <sub>j</sub> =150°C	-	1.90	-	V
V <sub>GE(th)</sub>	Gate-Emitter threshold Voltage	I <sub>C</sub> =11.4mA, V <sub>CE</sub> =V <sub>GE</sub>		5.0	5.6	6.8	V
R <sub>Gint</sub>	Internal gate resistor	-	T <sub>j</sub> =25°C	-	2.5	-	Ω
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V f=1MHz	T <sub>j</sub> =25°C	-	24.9	-	nF
C <sub>res</sub>	Reverse transfer Capacitance			-	0.87	-	nF
I <sub>CES</sub>	Collector- Emitter Cut off Current	V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V	T <sub>j</sub> =25°C	-	-	1	mA
I <sub>GES</sub>	Gate-Emitter Leakage Current	V <sub>GE</sub> =20V, V <sub>CE</sub> =0V	T <sub>j</sub> =25°C	-	-	600	nA
t <sub>d(on)</sub>	Turn-on delay time	V <sub>CC</sub> =600V I <sub>C</sub> =300A V <sub>GE</sub> =+15V/-15V R <sub>G</sub> =0.5Ω Inductive load	T <sub>j</sub> =25°C	-	125	-	ns
			T <sub>j</sub> =125°C	-	136	-	
			T <sub>j</sub> =150°C	-	149	-	
t <sub>r</sub>	Rise time		T <sub>j</sub> =25°C	-	30	-	ns
			T <sub>j</sub> =125°C	-	35	-	
			T <sub>j</sub> =150°C	-	40	-	
t <sub>d(off)</sub>	Turn-off delay time		T <sub>j</sub> =25°C	-	300	-	ns
			T <sub>j</sub> =125°C	-	321	-	
			T <sub>j</sub> =150°C	-	342	-	
t <sub>f</sub>	Fall time	T <sub>j</sub> =25°C	-	165	-	ns	
		T <sub>j</sub> =125°C	-	178	-		
		T <sub>j</sub> =150°C	-	189	-		
E <sub>on</sub>	Turn-on power dissipation	T <sub>j</sub> =25°C	-	7.2	-	mJ	
		T <sub>j</sub> =125°C	-	9.6	-		
		T <sub>j</sub> =150°C	-	12.3	-		
E <sub>off</sub>	Turn-off power dissipation	T <sub>j</sub> =25°C	-	22.5	-	mJ	
		T <sub>j</sub> =125°C	-	24.6	-		
		T <sub>j</sub> =150°C	-	29.1	-		
I <sub>SC</sub>	V <sub>GE</sub> ≤ 15V, V <sub>CC</sub> = 800V, t <sub>p</sub> ≤ 10us, T <sub>VJ</sub> = 150°C			-	1102	-	A
R <sub>th(j-c)</sub>	Thermal Resistance, Junction to Case (IGBT)			-	0.11	-	°C/W

### Freewheeling Diode Electrical characteristics (T<sub>j</sub>=25°C unless otherwise specified, chip)

Symbol	Item	Condition	Value			Unit	
			Min.	Typ.	Max		
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 300A, V <sub>GE</sub> = 0V	T <sub>j</sub> = 25°C	-	2.0	2.4	V
			T <sub>j</sub> = 125°C	-	1.7	-	
			T <sub>j</sub> = 150°C	-	1.6	-	
I <sub>RM</sub>	Peak reverse recovery Current	(Switch side) V <sub>CC</sub> = 600V, I <sub>C</sub> = 300A V <sub>GE</sub> = ±15V	T <sub>j</sub> = 25°C	-	182	-	us
			T <sub>j</sub> = 125°C	-	192	-	
			T <sub>j</sub> = 150°C	-	202	-	
Q <sub>rr</sub>	Recovered charge	R <sub>G</sub> = 0.5Ω (FRD side) V <sub>RR</sub> = 600V, I <sub>F</sub> = 300A	T <sub>j</sub> = 25°C	-	40	-	A
			T <sub>j</sub> = 125°C	-	45.1	-	
			T <sub>j</sub> = 150°C	-	48.2	-	
E <sub>rr</sub>	Reverse recovered energy	V <sub>GE</sub> = -15V Inductive load switching operation	T <sub>j</sub> = 25°C	-	12.1	-	uC
			T <sub>j</sub> = 125°C	-	13.2	-	
			T <sub>j</sub> = 150°C	-	16.5	-	
R <sub>th(j-c)</sub>	Thermal Resistance, Junction to Case (Diode)		-	0.15	-	°C/W	

### Test Conditions

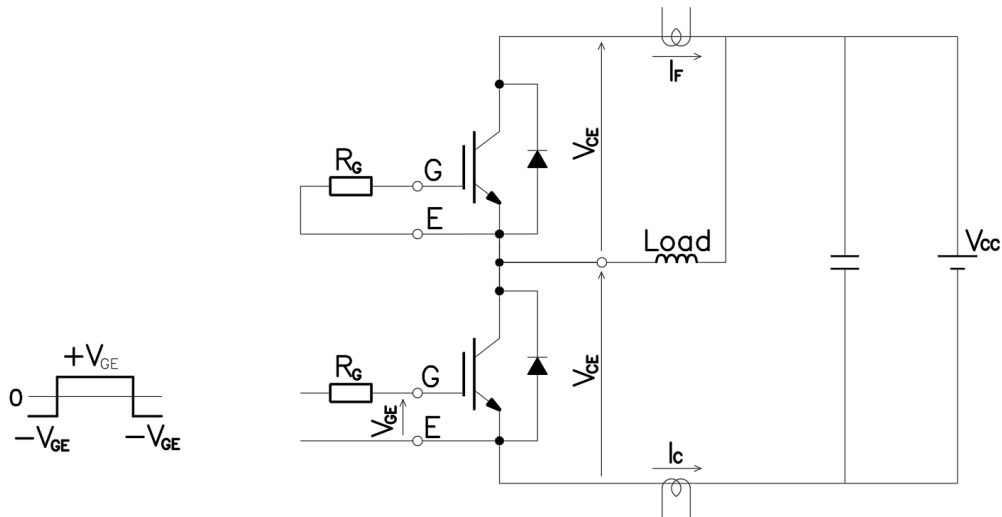


Figure 3. Switching time measure circuit

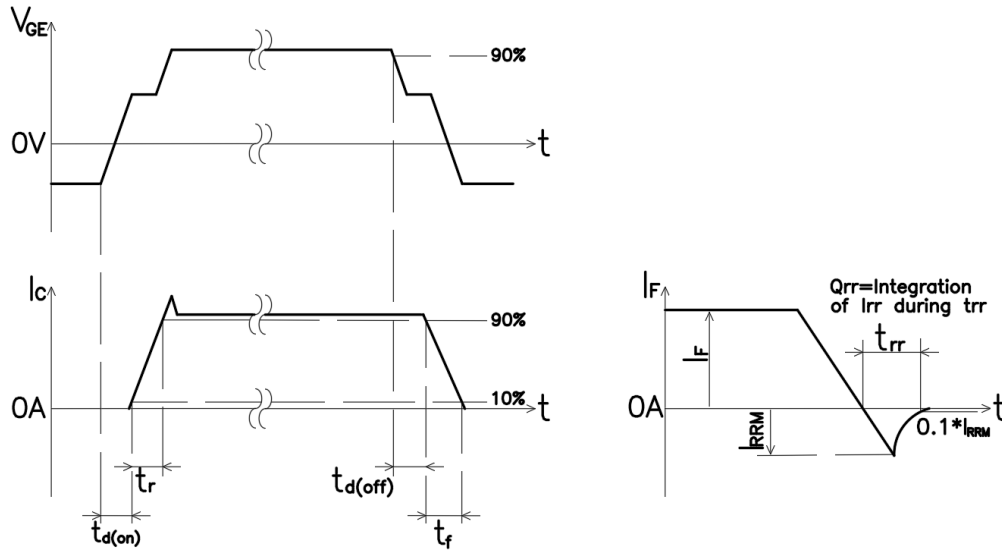


Figure 4. Switching time definition

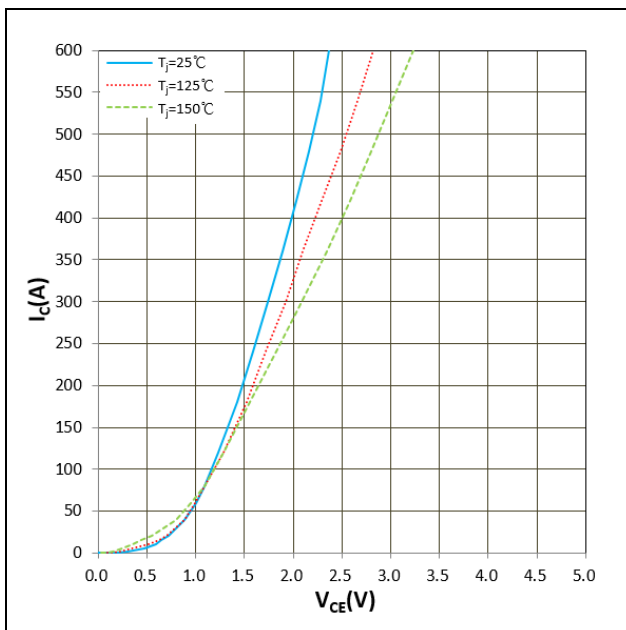


Figure 5.  $I_c$  vs  $V_{GE}$   
 $V_{GE} = 15V$

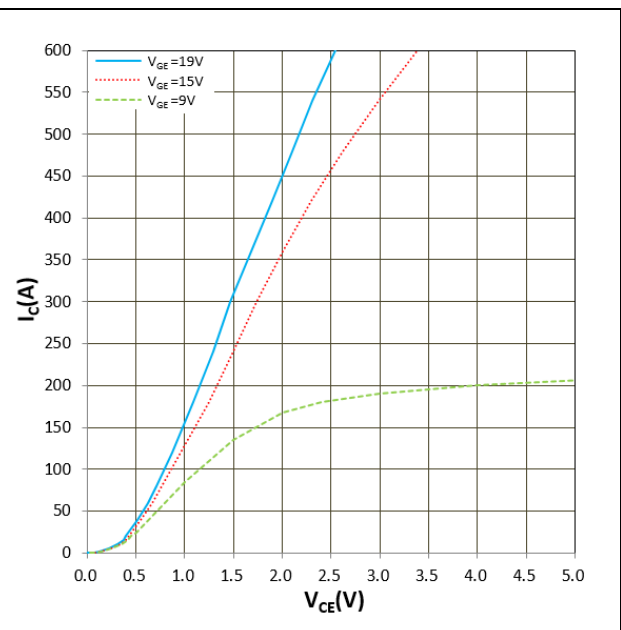


Figure 6.  $I_c$  vs  $V_{GE}$   
 $T_j = 25^\circ C$

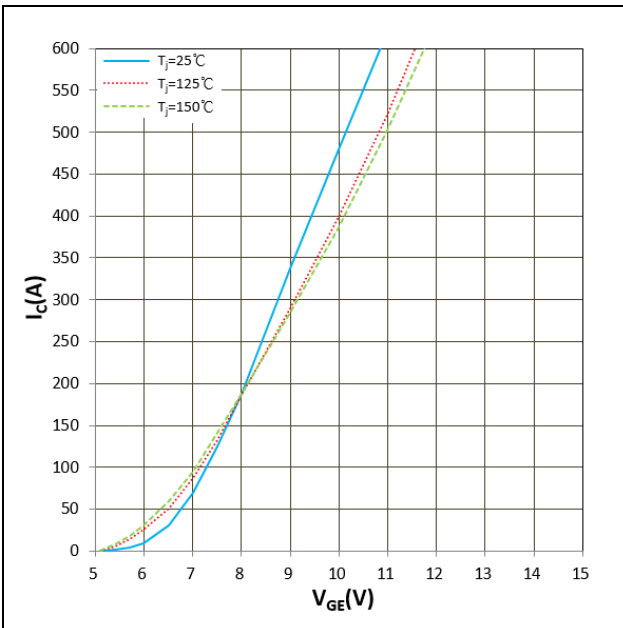


Figure 7.  $I_c$  vs  $V_{GE}$   
 $V_{CE} = 20V$

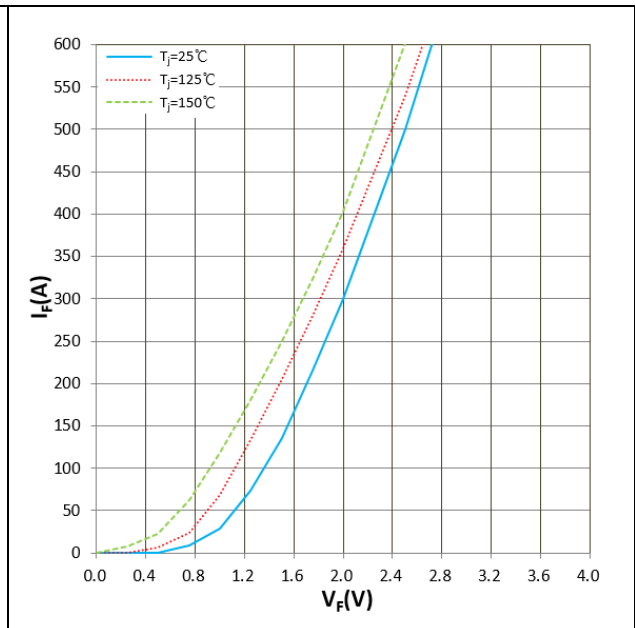


Figure 8.  $I_F$  vs  $V_F$

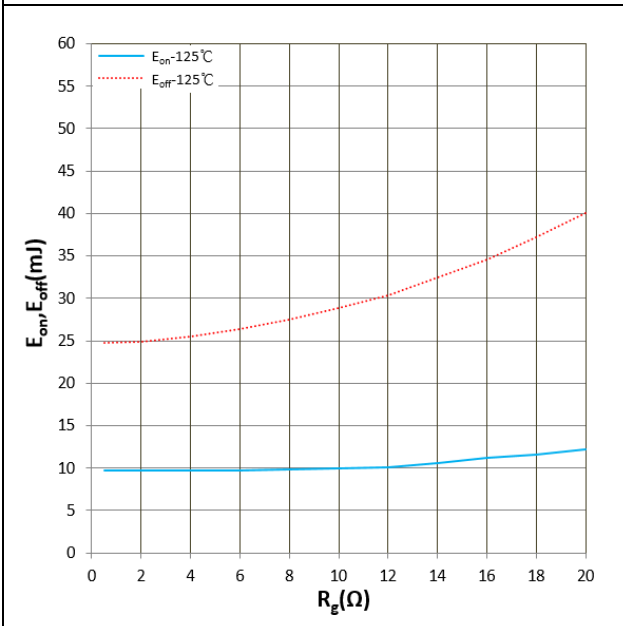


Figure 9.  $E_{on}$ ,  $E_{off}$  vs  $R_g$   
 $V_{CC} = 600V$ ,  $V_{GE} = \pm 15V$ ,  $I_c = 300A$

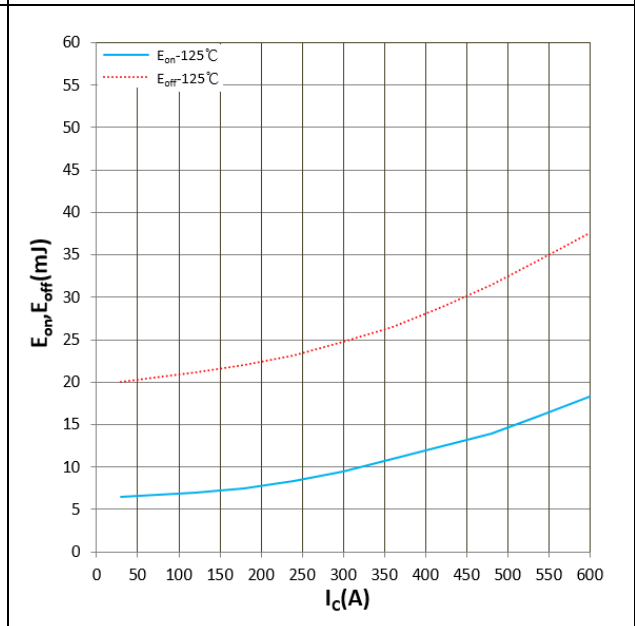


Figure 10.  $E_{on}$ ,  $E_{off}$  vs  $I_c$   
 $V_{CC} = 600V$ ,  $V_{GE} = \pm 15V$ ,  $R_g = 0.5\Omega$

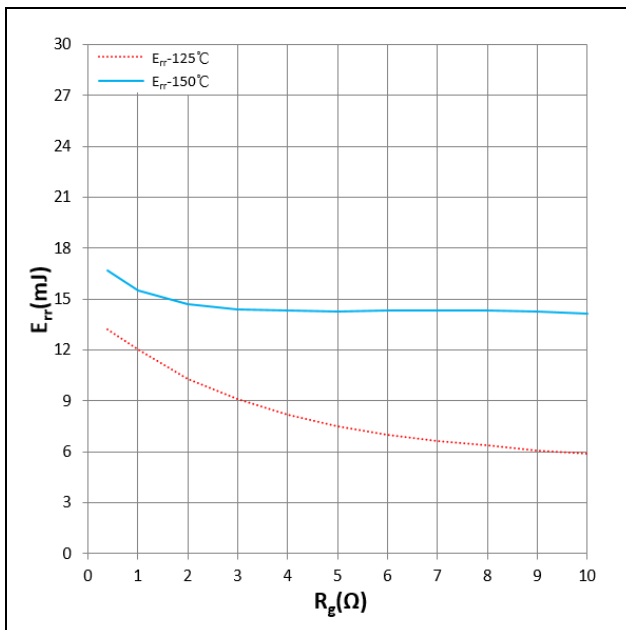


Figure 11.  $E_{rr}$  vs  $R_g$   
 $V_{CC}=600V, I_C=300A$

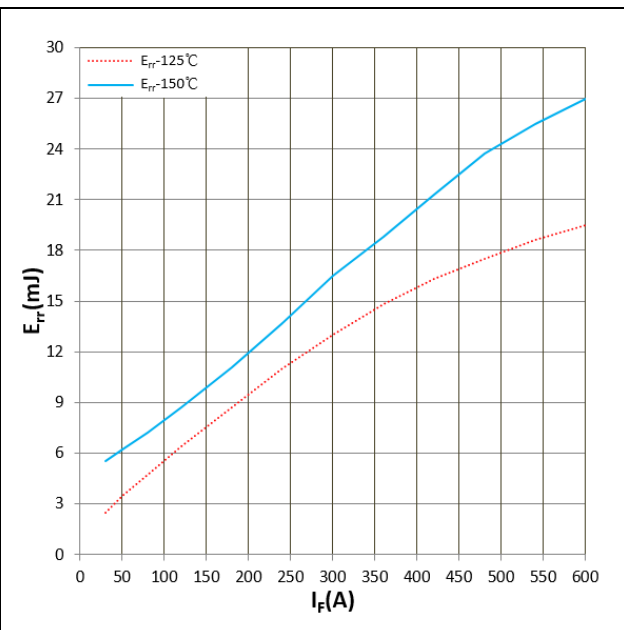


Figure 12.  $E_{rr}$  vs  $I_F$   
 $V_{CC}=600V, R_G=0.5\Omega$

### IMPORTANT NOTICE:

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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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