沟槽栅场截止型 IGBT
Trench-FS IGBT
FHA75T65A

主要参数 MAIN CHARACTERISTICS

I_C（100℃）	75 A
V_{CES}	650 V
V_{cesat}-typ（@I_C=75A）	1.75 V

产品特性 FEATURES

Trench-FS 技术	Trench Field Stop technology
低栅极电荷	Low gate charge
低开关损耗	Low Switching losses
低 V_{CEsat}	Low V_{CEsat}
符合 RoHS 标准	ROHS compliant
带有反向并行快回复二极管	With anti-parallel fast recovery diode
正温度系数	Positive temperature coefficient
高可靠性	High reliability

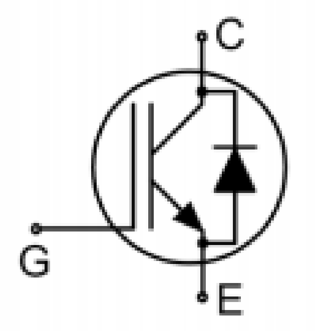
用途 APPLICATIONS

光伏逆变器	PV Inverter
不间断电源	UPS
电机驱动	Motor drive
电焊机	Welding Machines
PFC电路	PFC Circuits
中高开关频率变频器	Medium-high switching frequency converter

封装形式 Package

TO-247
FHA series

等效电路 Equivalent Circuit



绝对最大额定值 ABSOLUTE RATINGS（Tc=25℃）

项目 **parameter**	符 号 Symbol		数 值 Value	单 位 Unit
最高集电极一发射极直流电压 Collector-Emmiter Voltage	V_{CE}		650	V
连续集电极极电流 Collector Current-continuous	I_C	（T_C=25℃）	150	A
		（T_C=100℃）	75	
最大脉冲集电极极电流（注1） Collector Current – pulse （note 1）	I_{CM}		300	A
二极管连续正向电流 Diode Continuous Forward Current	I_F	（T_C=25℃）	150	A
		（T_C=100℃）	75	
二极管最大正向电流 Diode Maximum Forward Current	I_{FM}		300	A
最高栅极发射极电压 Gate-Emmiter Voltage	V_{GE}		±30	V
短路耐受时间 Short circuit withstand time VGE=15V, VCC≤400V, Allowed number of short circuits<1000, Times between short circuits: ≥ 1.0s,T_J ≤ 175°C	t_{SC}		3.0	us
耗散功率 Power Dissipation (T_C=25℃)	P_D		469	W
最高结温及存储温度 Operating and Storage Temperature Range	TJ，T_{STG}		-50～+175	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	TL		260	℃

注1：集极电流由最高结温限制
Note1:Collector current limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS(at T_C= 25°C, unless otherwise specified)

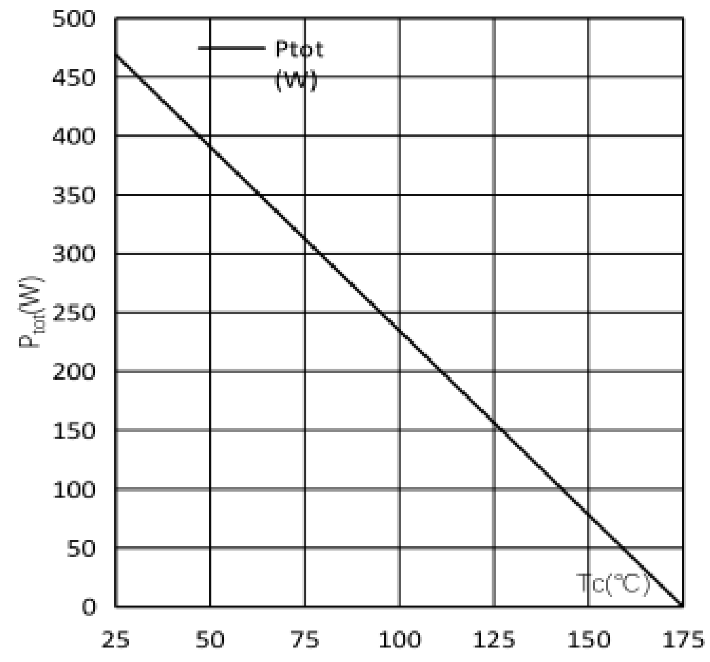
项目 Parameter	符号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 **Off –Characteristics**						
集电极一发射极击穿电压 Collector-Emmiter Voltage	BV_{CES}	V_{GE}=0V,I_C=250uA	650	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	I_C=1mA, referenced to 25℃	-	0.65	-	V/℃
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	I_{CES}	V_{CE} =650V,V_{GE} =0V	-	-	600	nA
栅极体漏电流 Gate-Emitter leakage current	$I_{GES(F/R)}$	V_{CE}=0V, V_{GE} =±30V	-	-	±200	nA
通态特性**On-Characteristics**						
阈值电压 Gate-Emmiter Threshold Voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C=1mA	4.8	5.5	6.0	V
饱和压降 Collector-Emmiter saturation Voltage	V_{CESAT}	V_{GE}=15V,I_C=75A,T_J =25°C , T_J =150°C	- -	1.75 1.55	2.0 -	V
动态特性 Dynamic Characteristics						
开启延迟时间 Turn-On delay time	td(on)	V_{GE}=15V, VCC=400V, IC=75A, RG=10Ω, T_J =25°C, Inductive Load L=60uH	-	76	-	ns
上升时间 Turn-On rise time	tr		-	115	-	ns
关断延迟时间 Turn-Off delay time	td(off)		-	196	-	ns
下降时间 Turn-Off Fall time	tf		-	79	-	ns
开启损耗 Turn-on energy	Eon		-	3.08	-	mJ
关断损耗 Turn-off energy	Eoff		-	2.22	-	
总的开关损耗 Total switching energy	Etotal		-	5.30	-	
开启延迟时间 Turn-On delay time	td(on)	V_{GE}=15V, VCC=400V, IC=75A, RG=10Ω, T_J =150°C, Inductive Load L=60uH	-	71	-	ns
上升时间 Turn-On rise time	tr		-	120	-	ns
关断延迟时间 Turn-Off delay time	td(off)		-	211	-	ns
下降时间 Turn-Off Fall time	tf		-	82	-	ns
开启损耗 Turn-on energy	Eon		-	5.21	-	mJ
关断损耗 Turn-off energy	Eoff		-	2.57	-	
总的开关损耗 Total switching energy	Etotal		-	7.78	-	
栅极电荷总量 Total Gate Charge	Qg	V_{CE}=400V, I_C=75A, V_{GE}=15V	-	142	-	nC
栅极-发射极电荷 Gate-emitter charge	Qge		-	34.6	-	
栅极-集电极电荷 Gate-collector charge	Qgc		-	63	-	
集电极短路电流 Short circuit collector current (最大值100sc；短路时间间隔：≥1.0s)	Ic(sc)	V_{GE}=15V, V_{CC}≤400V, t_{SC}≤3us, T_J ≤150°C	-	360	-	A
栅极电阻 Gate Resistance	Rg	f=1.0MHz,V_{CE} OPEN	-	1.7	-	Ω
输入电容 Input capacitance	Cies	V_{CE}=30V, V_{GE} =0V, f=1.0MHz	-	3910	-	pF
输出电容 Output capacitance	Coes		-	244	-	
反向传输电容 Reverse transfer capacitance	Cres		-	34	-	

二极管特性Diode characteristics						
项目 Parameter	**符号 Symbol**	**测试条件 Tests conditions**	**最小 Min**	**典型 Typ**	**最大 Max**	**单位 Units**
正向压降 Diode Forward Voltage	V_F	I_F=75A	-	1.95	2.2	V
反向恢复时间 Reverse recovery time	trr	I_F=75A , dI/dt=200A/μs, T_J =25°C	-	207	-	ns
反向恢复电流 Reverse recovery current	Irrm		-	4.2	-	A
反向恢复电荷 Reverse recovery charge	Qrr		-	1355	-	nC
反向恢复时间 Reverse recovery time	trr	I_F=75A , dI/dt=200A/μs, T_J =150°C	-	323	-	ns
反向恢复电流 Reverse recovery current	Irr		-	5.0	-	A
反向恢复电荷 Reverse recovery charge	Qrr		-	4812	-	nC

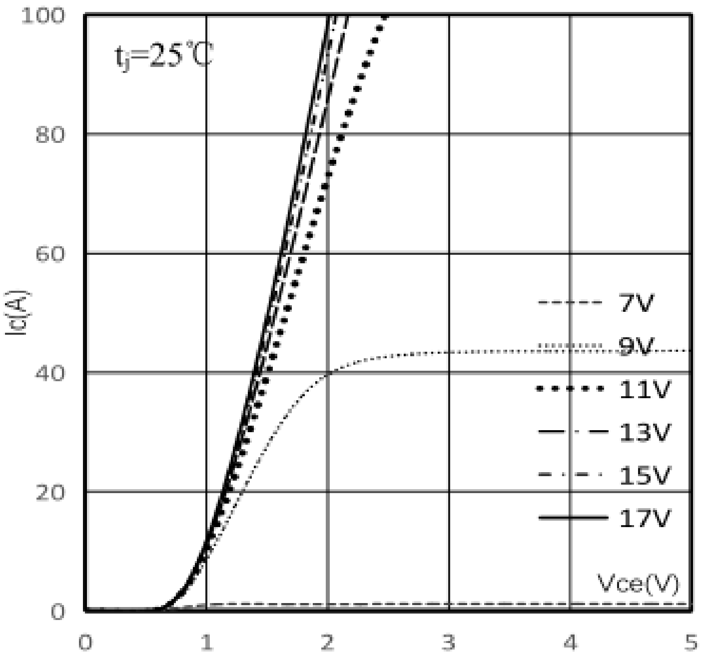
热特性 THERMAL CHARACTERISTIC

项目 Parameter	**符号 Symbol**	数值 **Value**	**单位 Unit**
结到管壳的热阻 (IGBT) Thermal Resistance, Junction to Case (IGBT)	Rth(j-c)	0.32	℃/W
结到管壳的热阻 (Diode) Thermal Resistance, Junction to Case (Diode)	Rth(j-c)	0.45	℃/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	40	℃/W

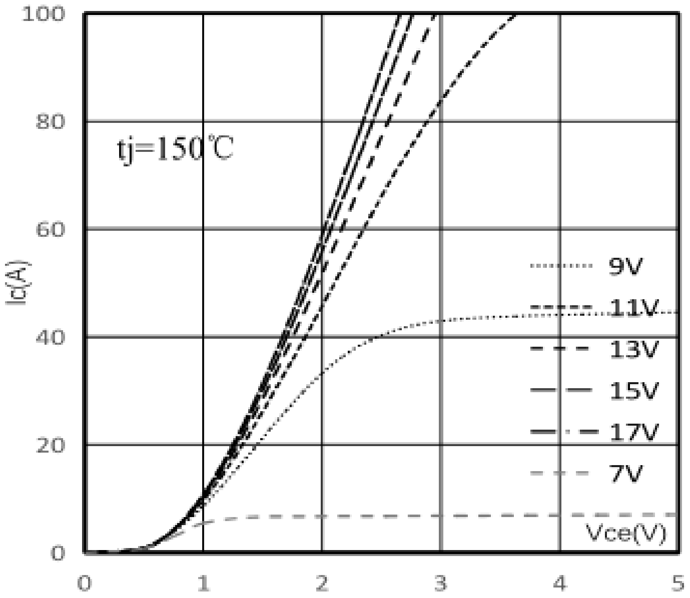
特性曲线
（ELECTRICAL CHARACTERISTICS (curves)）



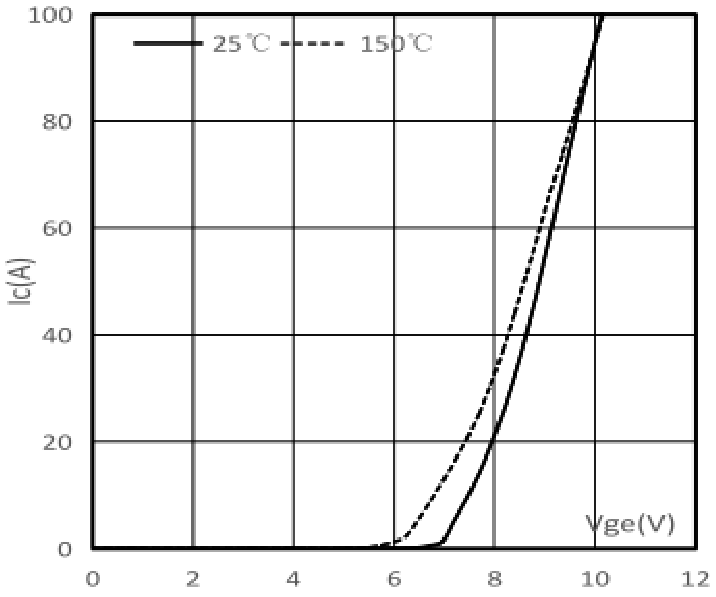
P_{tot} as a function of case Temperature



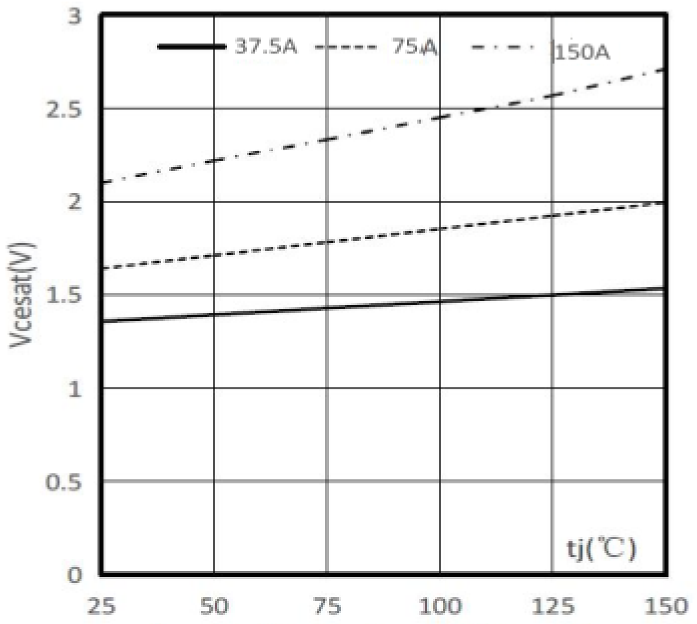
Typical Output Characteristic_25℃



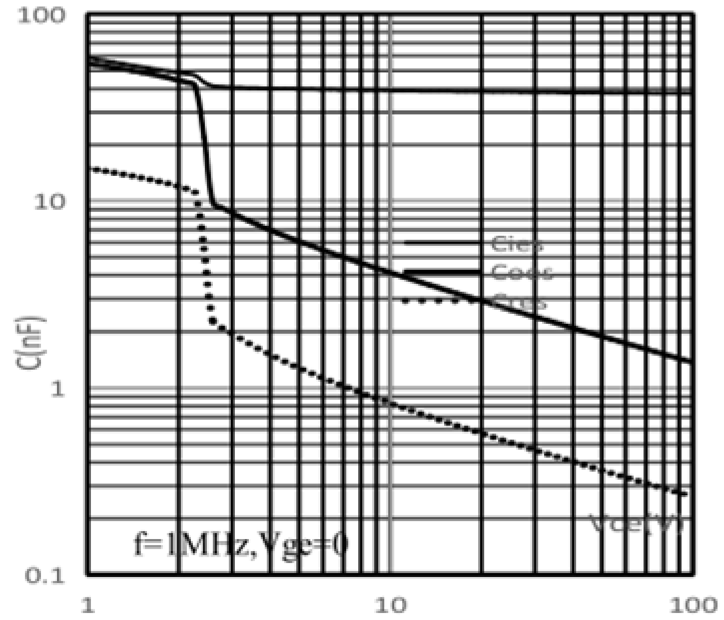
Typical Output Characteristic_150℃



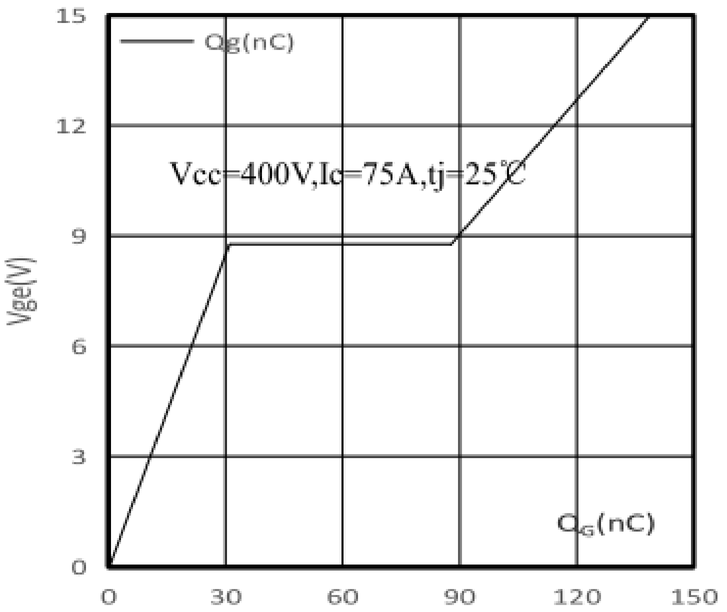
Typical Output Characteristic



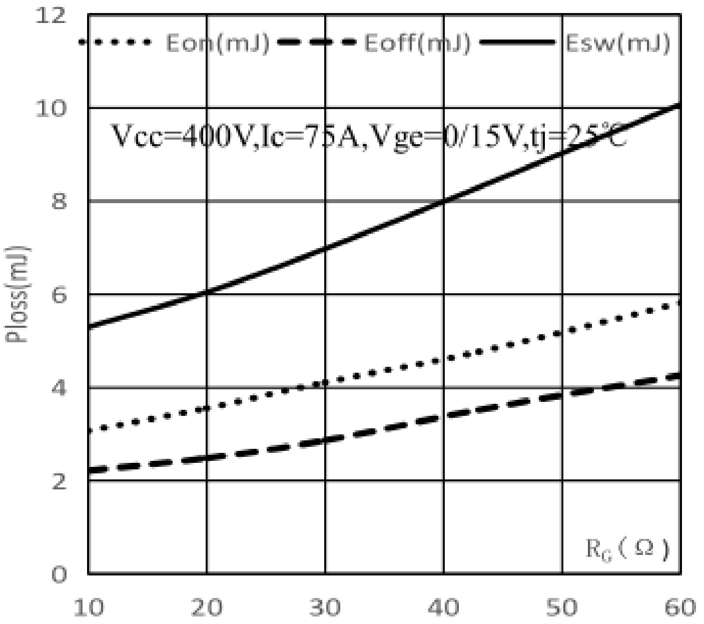
Vcesat as a function of temperature



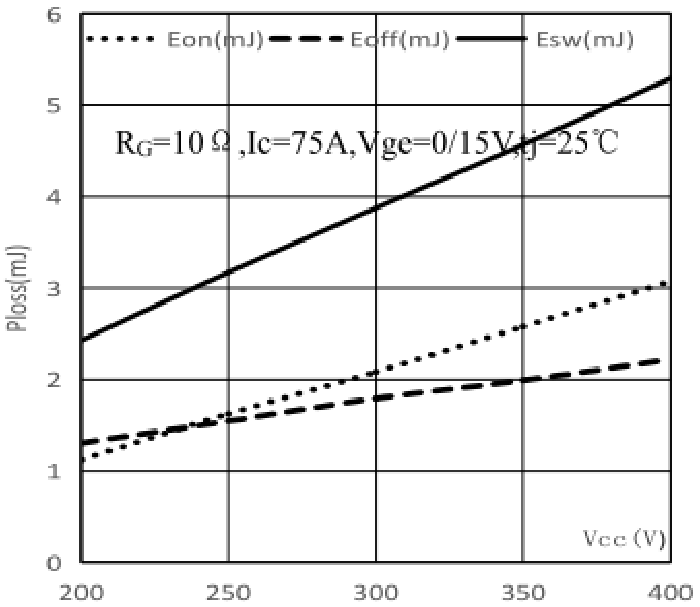
Capacitance as a function of Vce



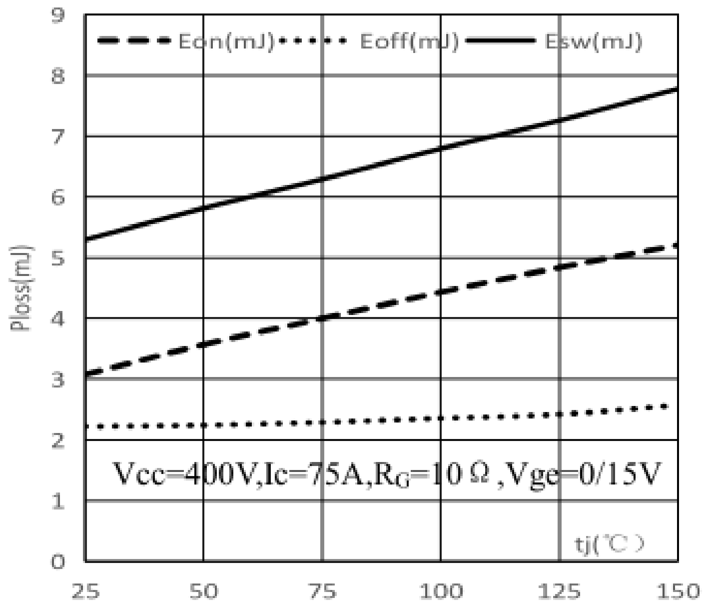
Typical gate charge



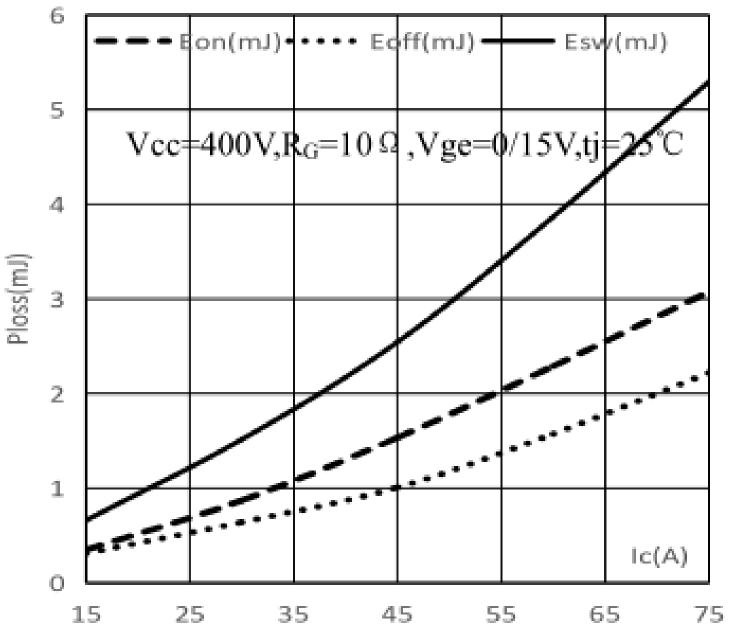
Typical switching losses of R_G



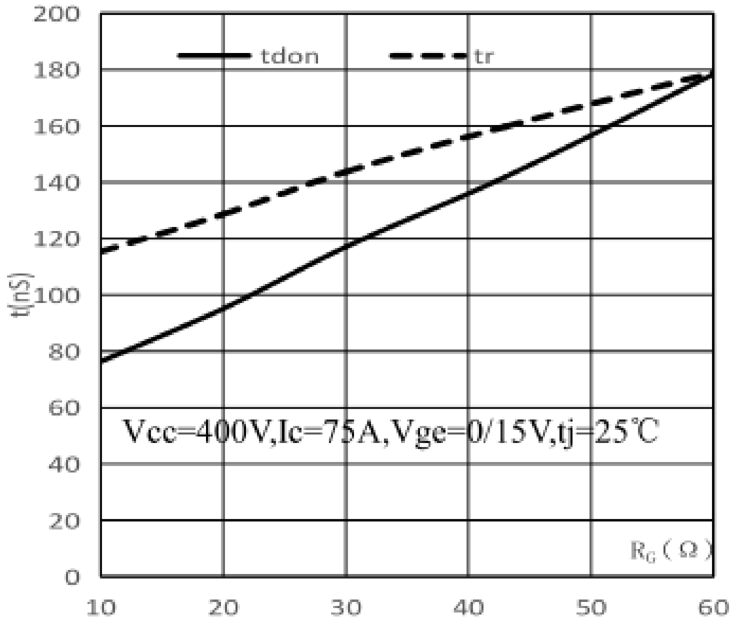
Typical switching losses of V_{CC}



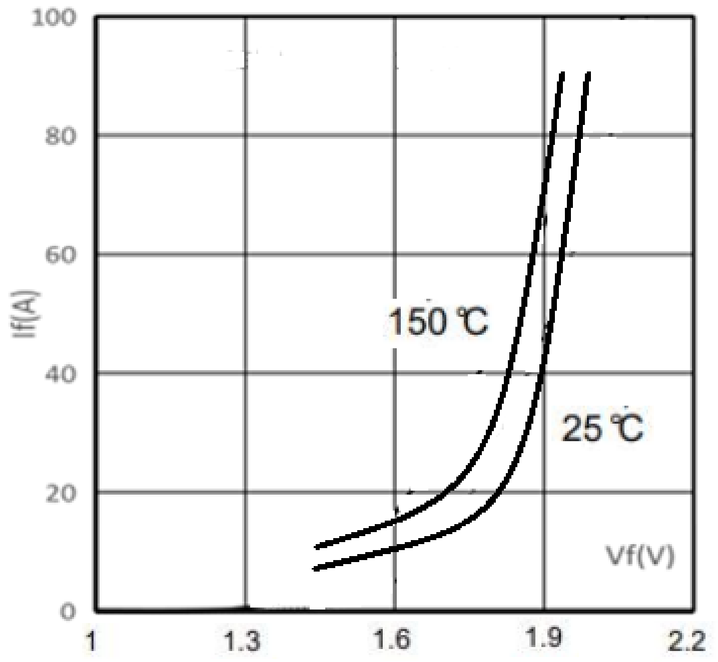
Typical switching losses of t_J



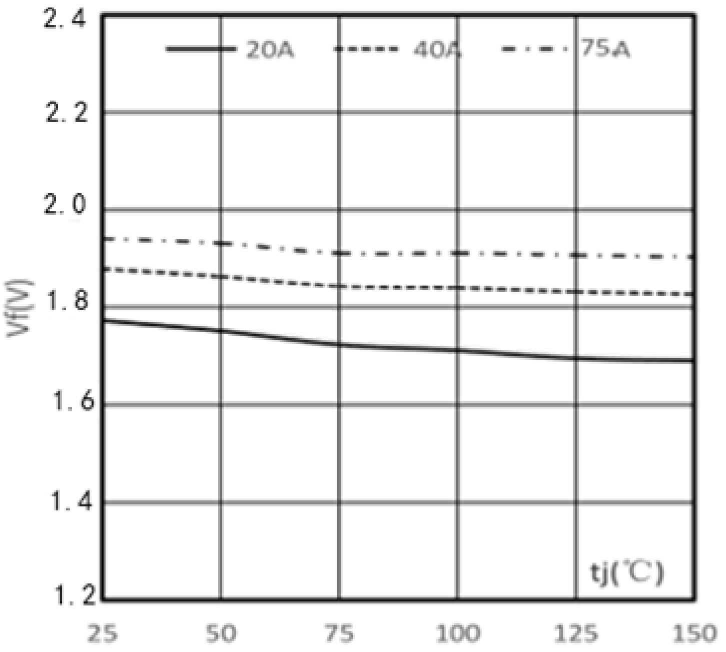
Typical switching losses of I_C



Typical switching times as a function of R_G



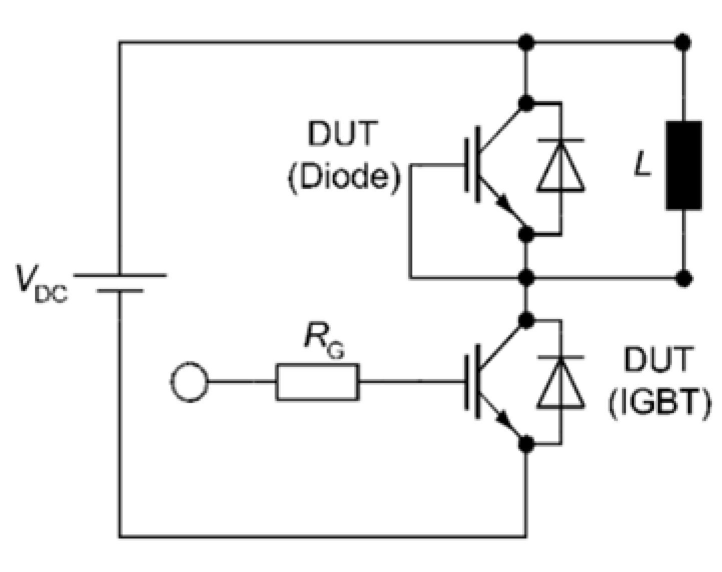
Typical I_F as a function of V_F



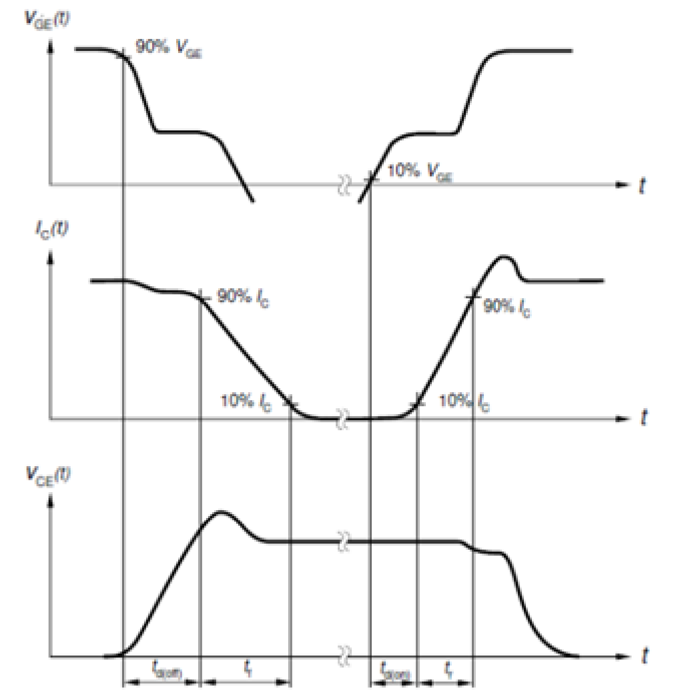
Vf as a function of temperature

Test Circuit and Waveform

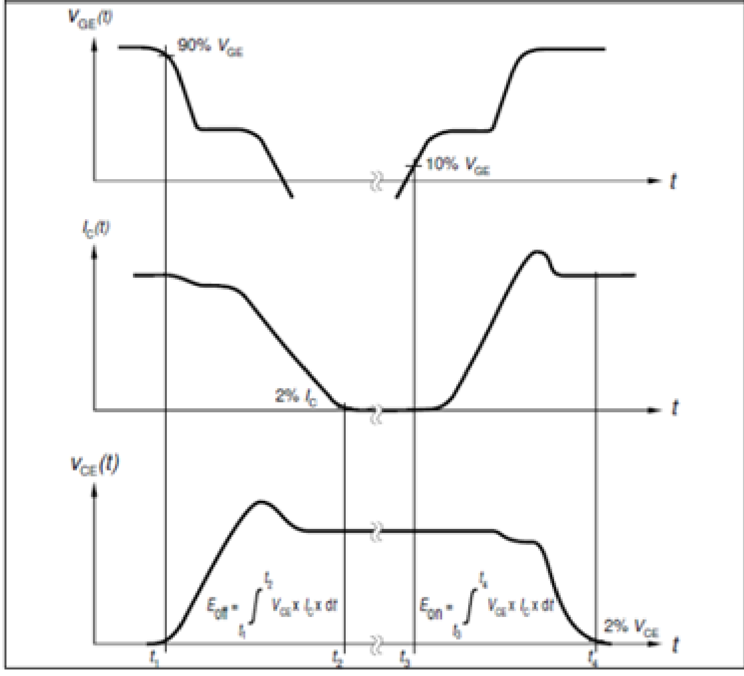
Inductive Switching Test Circuit



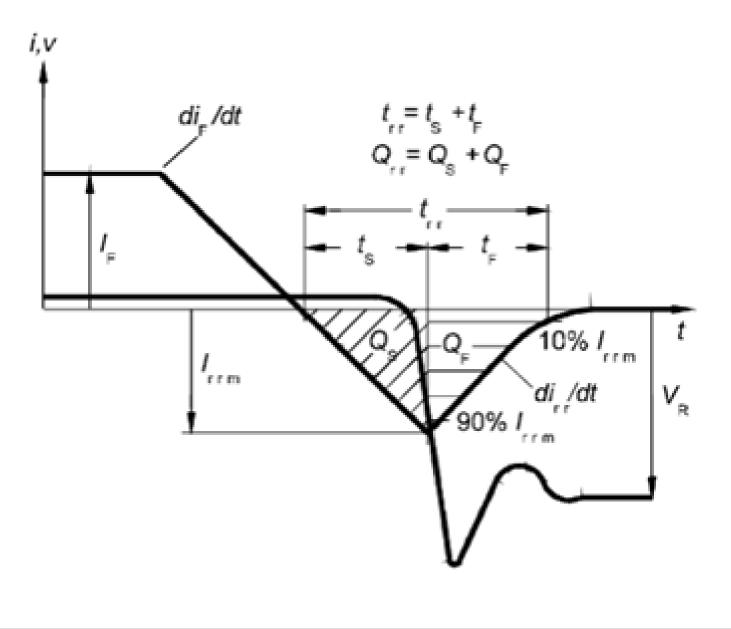
Definition of switching times



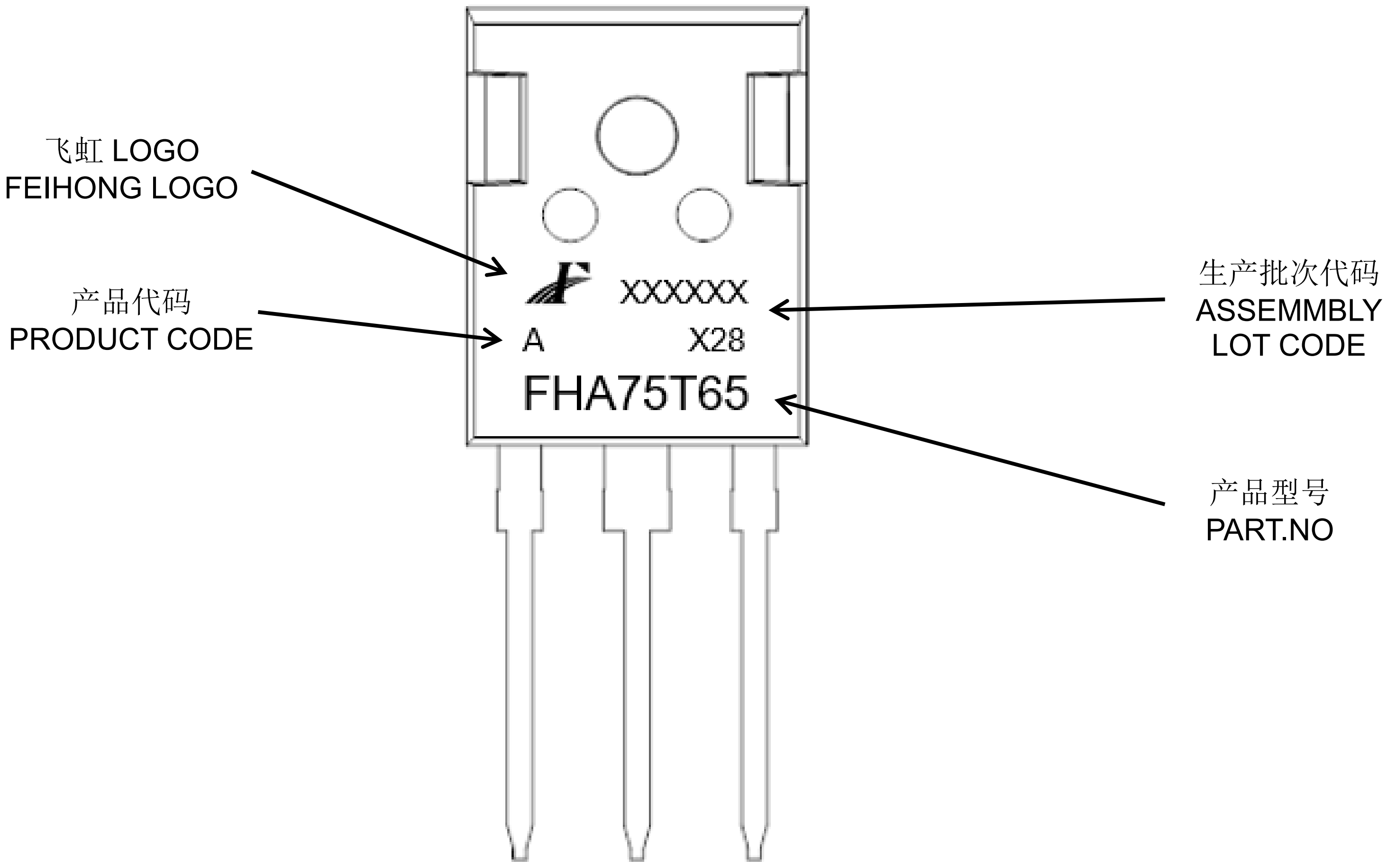
Definition of switching losses



Definition of diode switching characteristics



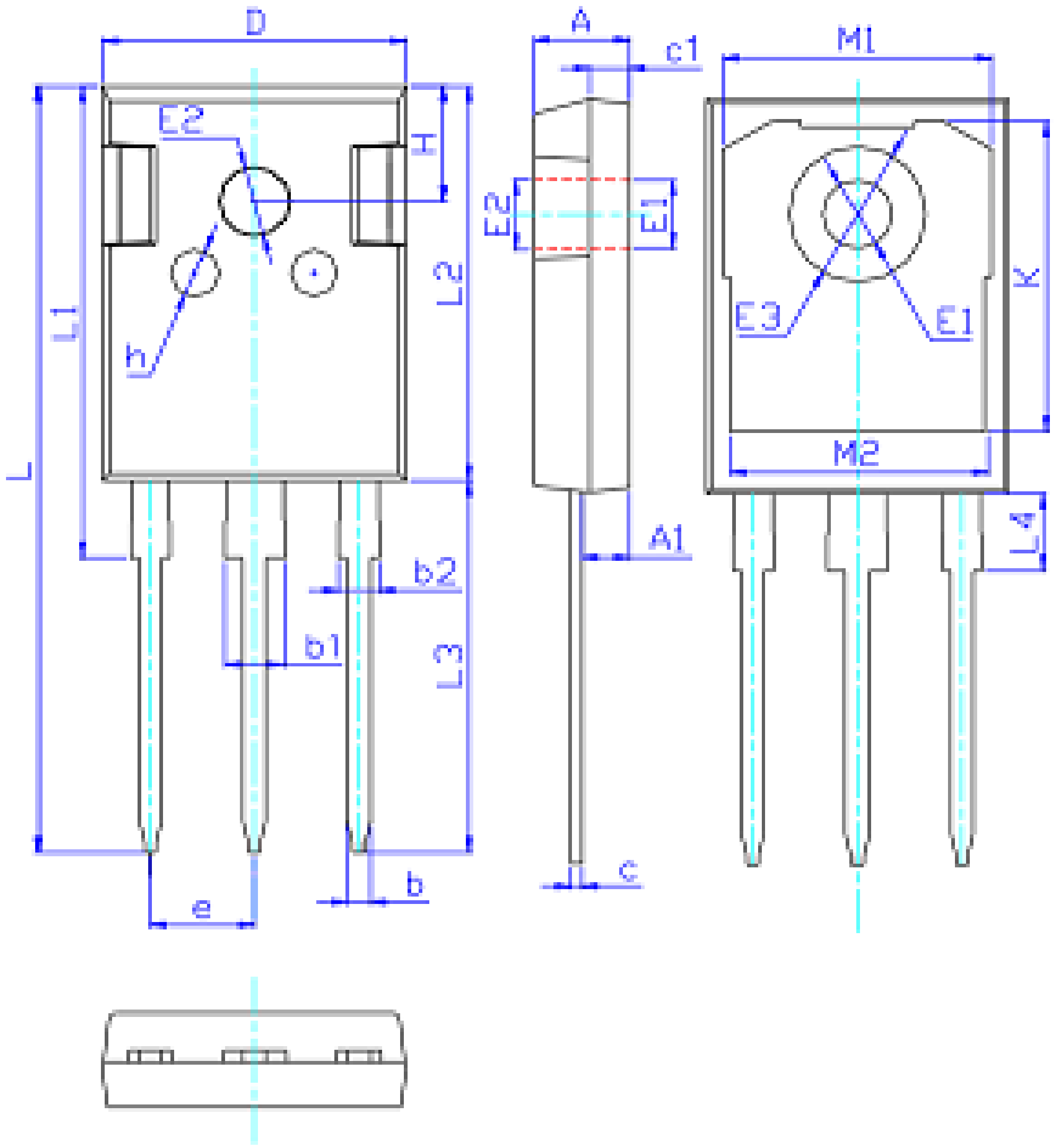
印记 Marking:


飞虹 LOGO
FEIHONG LOGO
产品代码
PRODUCT CODE
XXXXXX
A
X28
FHA75T65
生产批次代码
ASSEMMBLY
LOT CODE
产品型号
PART.NO

外形尺寸：

Package Dimension：

TO-247



标注	尺寸(mm)
A	5.00±0.05
A1	2.41±0.05
b	1.2±0.05
b1	3.05±0.05
b2	2.05±0.05
c	0.60±0.05
c1	2.00±0.05
D	15.80±0.10
E1	3.60±0.05
E2	3.70±0.05
E3	7.19±0.05
L	40.92±0.10
L1	24.95±0.10
L2	21.00±0.10
L3	19.92±0.10
L4	4.10±0.05
e	5.44±0.05
H	6.15±0.05
h	2.50±0.05
K	16.45±0.10
M1	14.00±0.10
M2	13.30±0.10