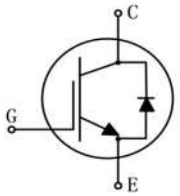
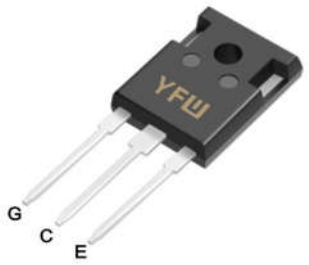
1350V N-Channel Enhancement Mode Power IGBT

MAIN CHARACTERISTICS

$I_{C\ @TC=25℃}$	25A
V_{CES}	1350V
VCE(sat)-typ	2.6V





TO-247

FEATURES

- High breakdown voltage to 1350V for improved reliability
- Trench-Stop Technology offering :

High speed switching
High ruggedness, temperature stable Low VCEsat
Easy parallel switching capability due to positive temperature coefficient in VCEsat

- Soft current turn-off waveforms
- Enhanced avalanche capability

APPLICATIONS

- Inductive cooking
- Inverterized microwave ovens
- Resonant converters
- Soft switching applications

MECHANICAL DATA

- Case: TO-247/AP
- Mounting Position: Any
- Molded Plastic: UL Flammability Classification Rating 94V-0
- Lead free in compliance with EU RoHS 2011/65/EU directive
- Solder bath temperature 275℃ maximum,10s per JESD 22-B106

Maximum Ratings

Characteristics	Symbol	Value	Unit
Collector-emitter voltage	V_{CES}	1350	V
Gate-emitter voltage	V_{GES}	±20	V
Continuous collector current (T_C=25℃)	I_C	25	A
Pulsed collector current, tp limited by Tvjmax	I_{CM}	50	A
Diode continuous forward current (T_C=100℃)	I_F	25	A
Diode maximum current, tp limited by Tvjmax	I_{FM}	50	A
Power dissipation(T_C=25°C)	P_{tot}	3	W
Operating junction temperature range	T_{vj}	150	°C
Storage temperature range	T_{stg}	-55 to +150	°C

Thermal characteristics

Parameter	Symbol	Values	Unit
Thermal resistance, junction to case for IGBT	$R_{th(j-c)}$	0.48	K/ W
Thermal resistance, junction to case for Diode	$R_{th(j-c)}$	1.2	K/ W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	40	K/ W

Note1:Pulse test: 300 μs pulse width, 2 % duty cycle

Electrical characteristics of IGBT at Tvj=25℃ unless otherwise specified

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
Collector-emitter breakdown voltage	V_{GE}=0V, I_C=250μA	B_{VCES}	1350	-	-	V
Collector-emitter leakage current	V_{CE}=1350V, V_{GE}=0V	I_{CES}	-	-	200	μA
Gate leakage current, forward	V_{GE}=±20V, V_{CE}=0V	I_{GES}	-	-	±100	nA
Gate-emitter threshold voltage	V_{GE}=V_{CE}, I_C=250μA	$V_{GE(th)}$	4	-	8	V
Collector-emitter saturation voltage	V_{GE}=15 V, I_C=25A	$V_{CE(sat)}$	-	-	2.6	V
Transconductance	V_{GE}=20 V, I_C=25A	gfs	-	13	-	S
Input capacitance	V_{CE}=25V V_{GE}=0V f =1MHz	C_{ies}	-	2500	-	pF
Output capacitance		C_{oes}	-	70	-	pF
Reverse transfer capacitance		C_{res}	-	50	-	pF
Total gate charge	V_{CC}=600V V_{GE}=15V I_C=25A	Q_g	-	125	-	nC
Turn-on delay time	V_{CC}=600V V_{GE}=0/15V I_C=25A R_G=10Ω Inductive load	td(on)	-	180	-	ns
Rise time		tr	-	40	-	ns
Turn-off energy		Eoff	-	0.32	-	mJ
Turn-on delay time	V_{CC}=600V，V_{GE}=0/15V I_C=25A， R_G=10Ω Inductive load，Tvj=175℃	td(on)	-	220	-	ns
Rise time		tr	-	90	-	ns
Turn-off energy		Eoff	-	0.65	-	mJ
Diode breakdown voltage	I_R=100μA,Tamb=25℃	V_{BR}	1350	-	-	V
Diode reverse current	V_R=1350V,Tamb=25℃	I_R	-	-	5	μA
Diode forward voltage	I_F=6A,Tvj=25℃	V_F	-	-	2	V
	I_F=25A,Tvj=25℃		-	-	3.5	V
Diode reverse recovery time	I_F=0.5A,I_R=1.0A,Irr=0.25A,Tamb=25℃	trr	-	-	75	ns

RATINGS AND CHARACTERISTIC CURVES

Fig. 1 Output characteristic V_{CE} vs. I_C at 25℃

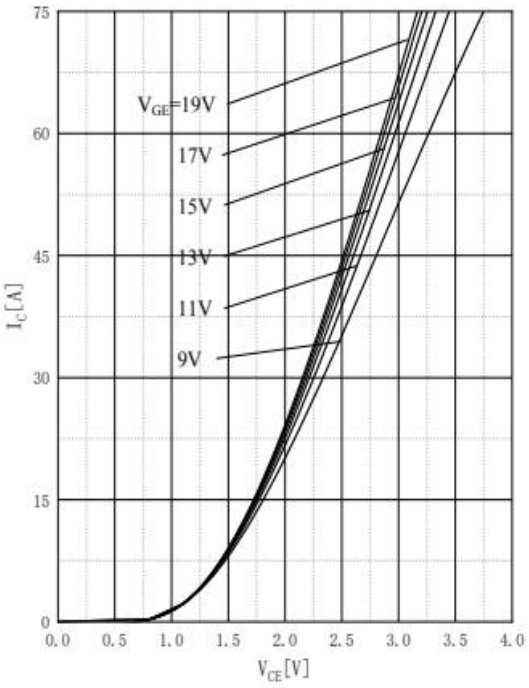


Fig. 2 Output characteristic V_{CE} vs. I_C at 175℃

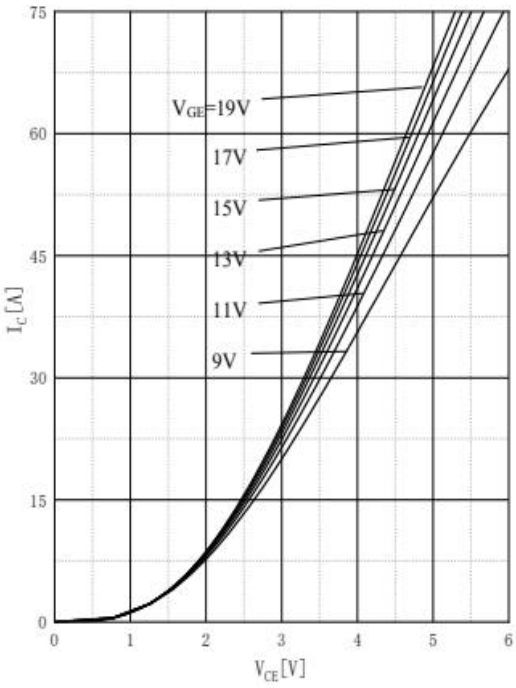


Fig. 3 Transfer characteristic V_{GE} vs. I_C

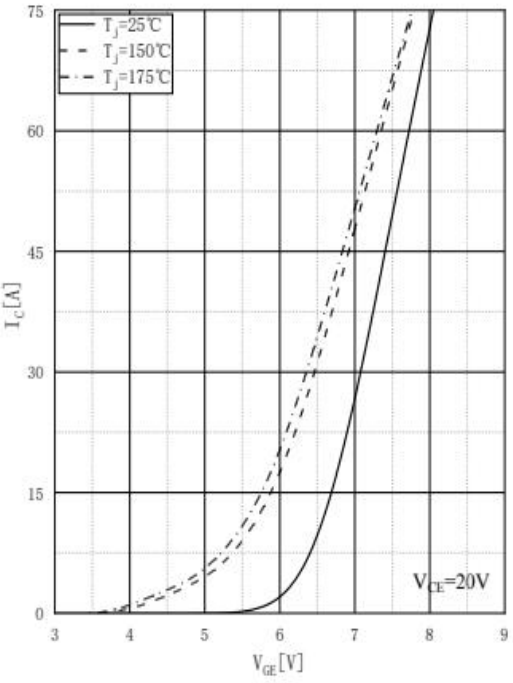


Fig. 4 Collector-emitter saturation voltage as a function of junction temperature V_{CEsat} vs. T_j

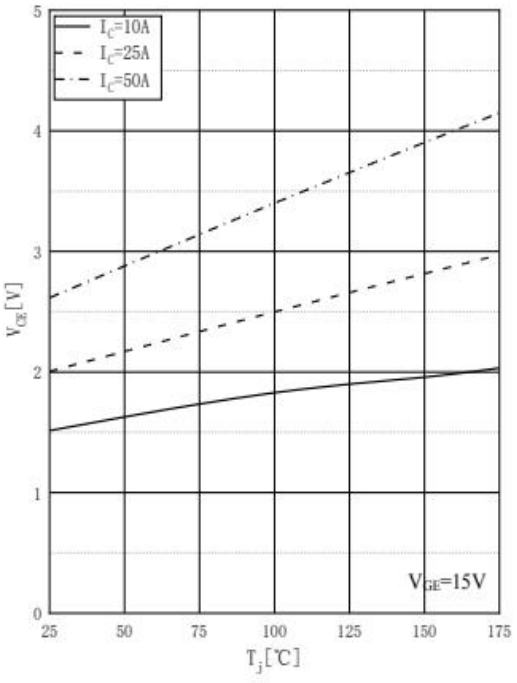


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Fig. 5 Gate-emitter threshold voltage as a function of junction temperature $V_{GE(th)}$ vs. T_j

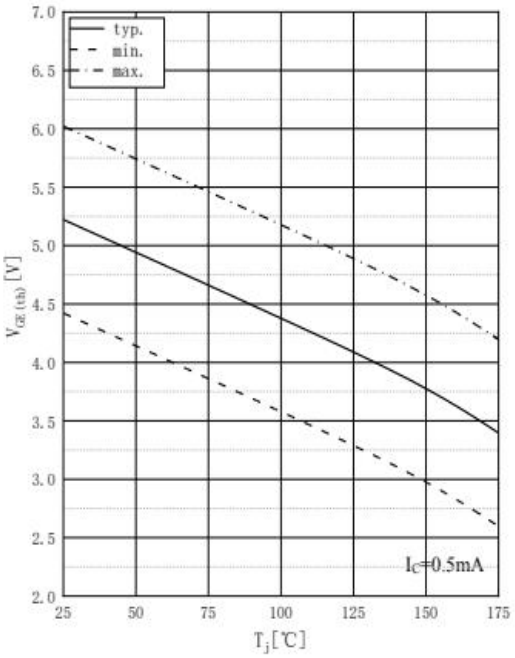

Fig. 6 Gate charge Q_G

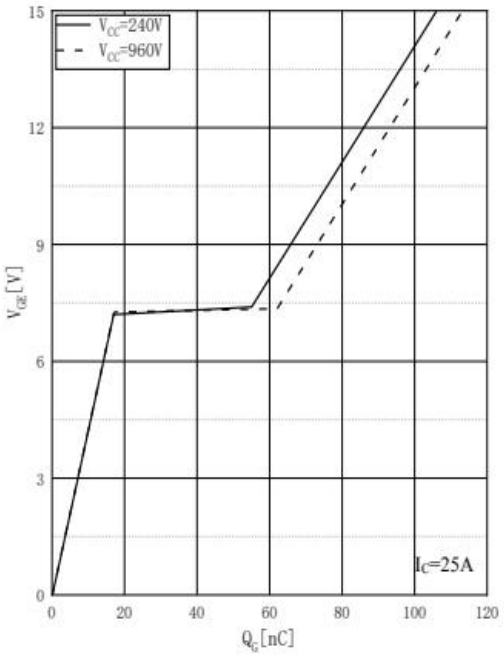

Fig. 7 Capacitance characteristic

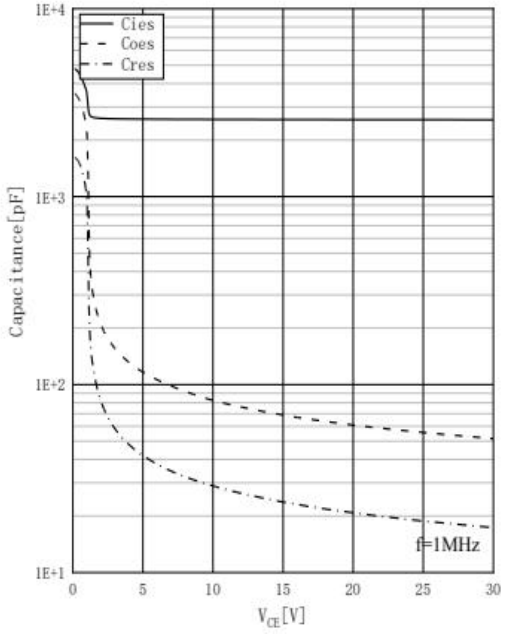

Fig. 8 Diode forward current as a function of forward voltage V_F vs. I_F

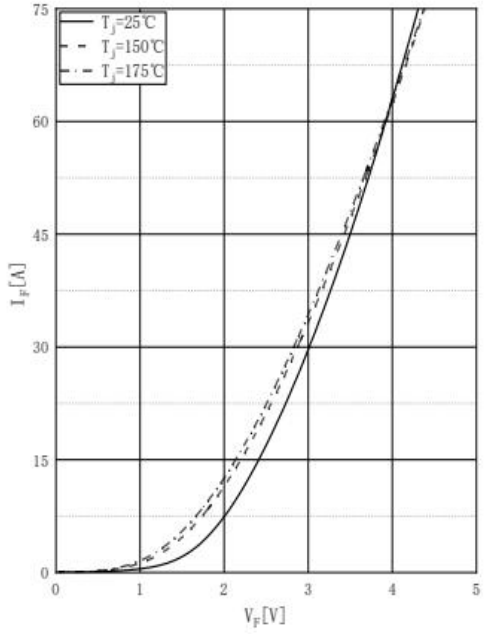

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Fig. 9 Diode forward voltage as a function of junction temperature V_F vs. T_j

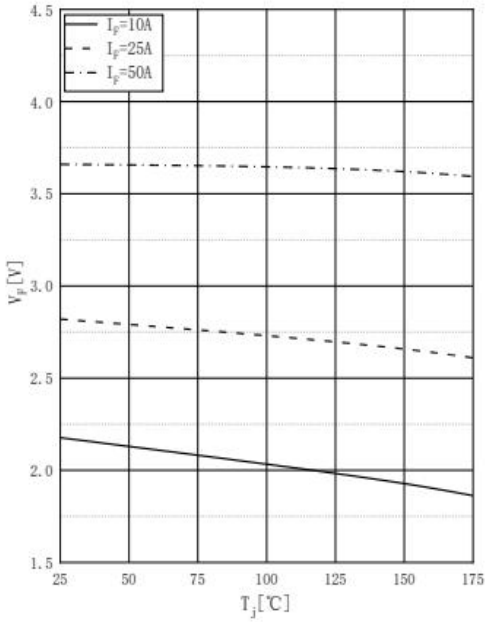

Fig. 10 Switching times vs. Collector current I_C

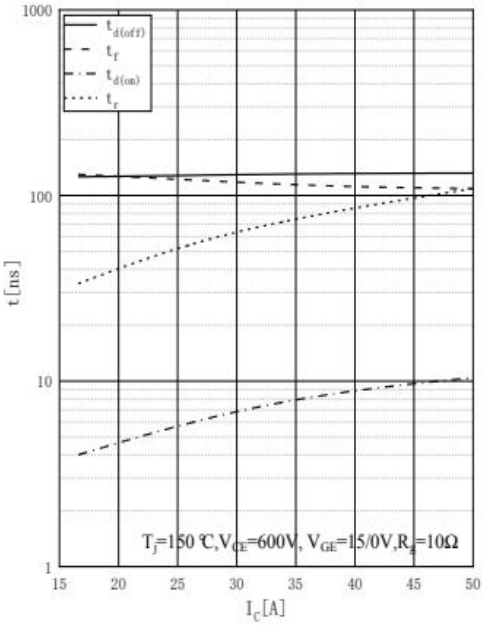

Fig. 11 Switching times vs. Gate resistor R_g

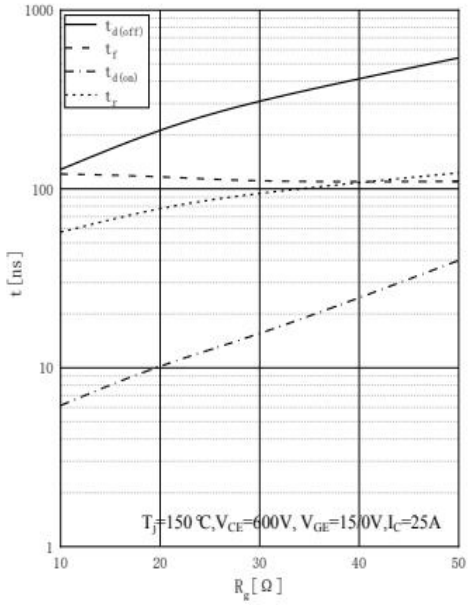

Fig. 12 Switching times vs. Junction temperature T_j

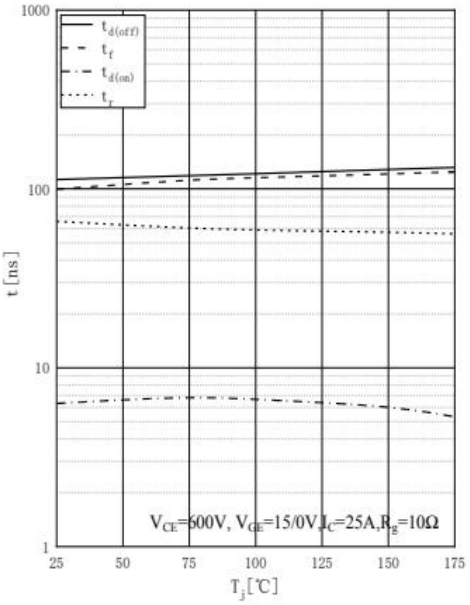

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Fig. 13 Switching energy loss vs. Collector current I_C

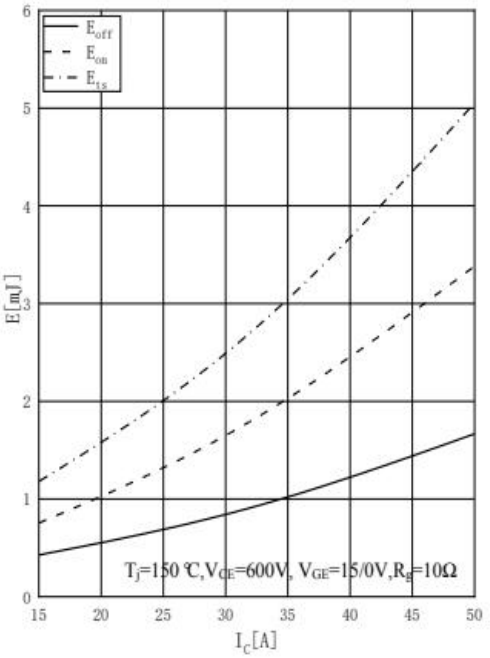

Fig. 14 Switching energy loss vs. Gate resistor R_g

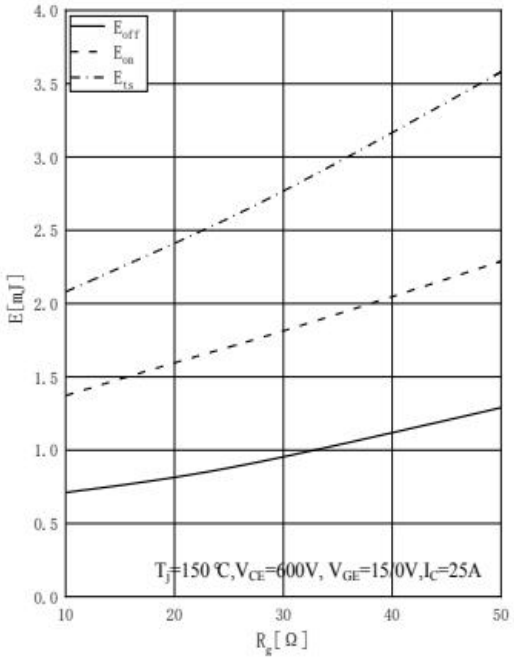

Fig. 15 Switching energy loss vs. Junction temperature T_j

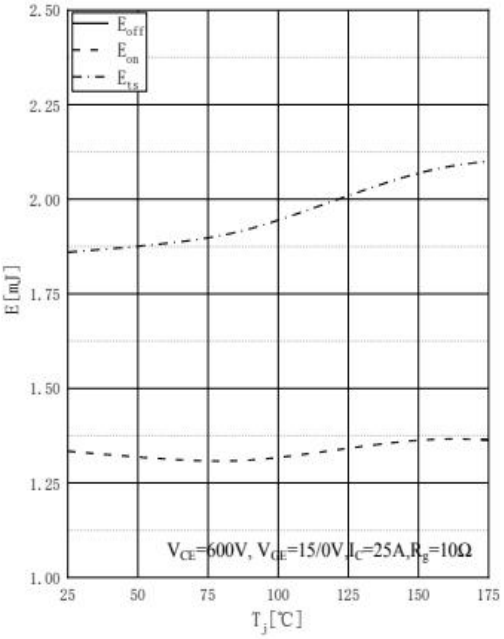

Fig. 16 Reverse recovery energy as a function of diode current slope E_{rr} vs. di_F/dt

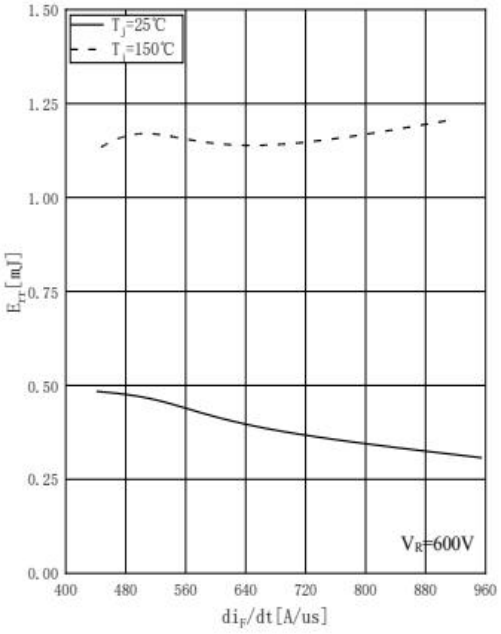

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Fig. 17 Reverse recovery times as a function of diode current slope t_{rr} vs. di_F/dt

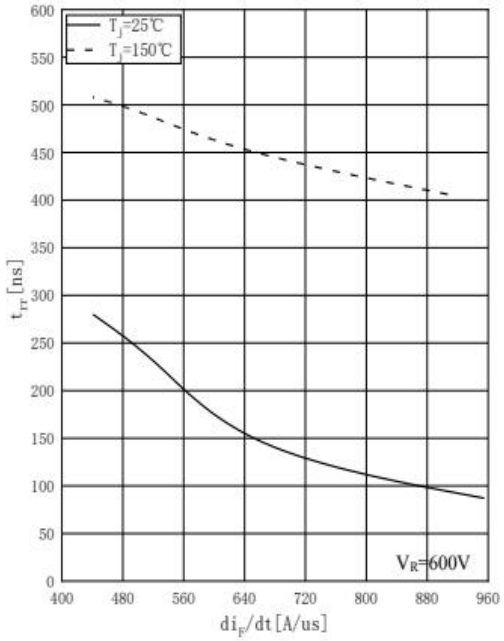

Fig. 18 Reverse recovery charge as a function of diode current slope Q_{rr} vs. di_F/dt

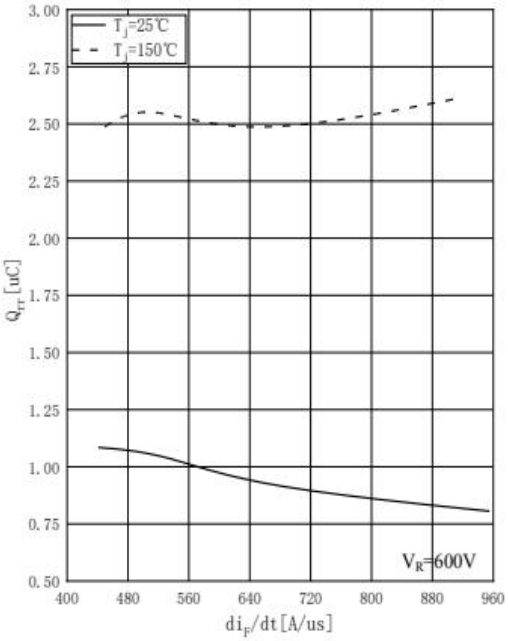

Fig. 19 Reverse recovery current as a function of diode current slope I_{rr} vs. di_F/dt

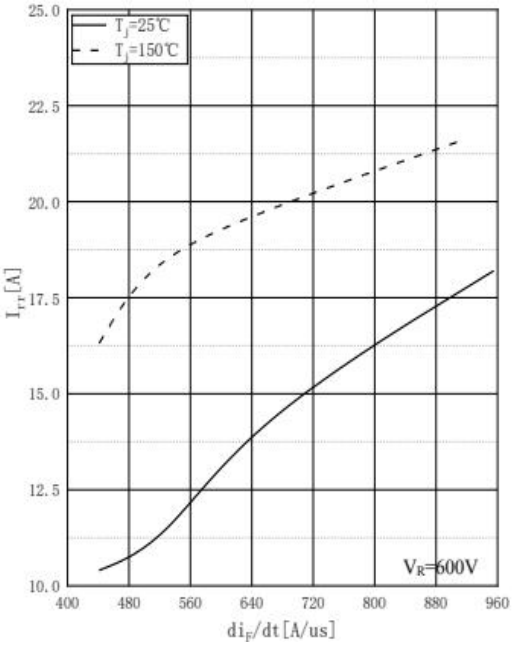

Fig. 20 Power dissipation as a function of case temperature P_{tot} vs. T_C

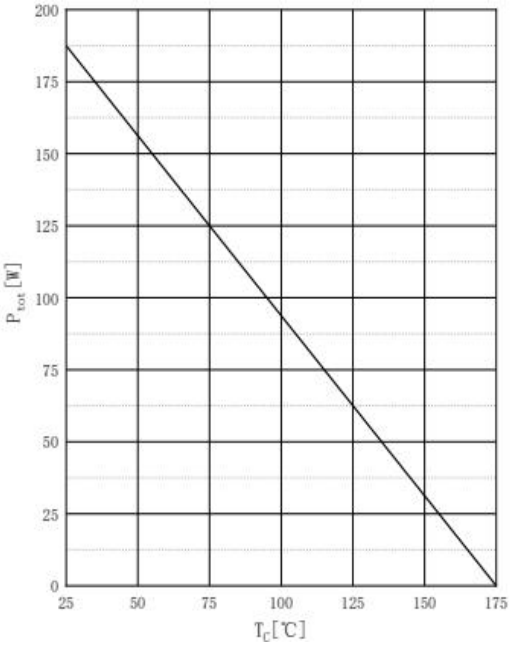

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Fig. 21 FBSOA characteristic

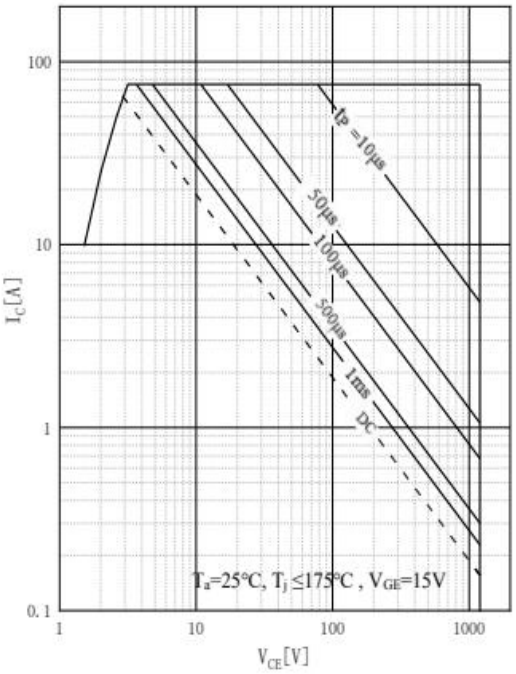


Fig. 22 IGBT transient thermal impedance Z_{thjc}

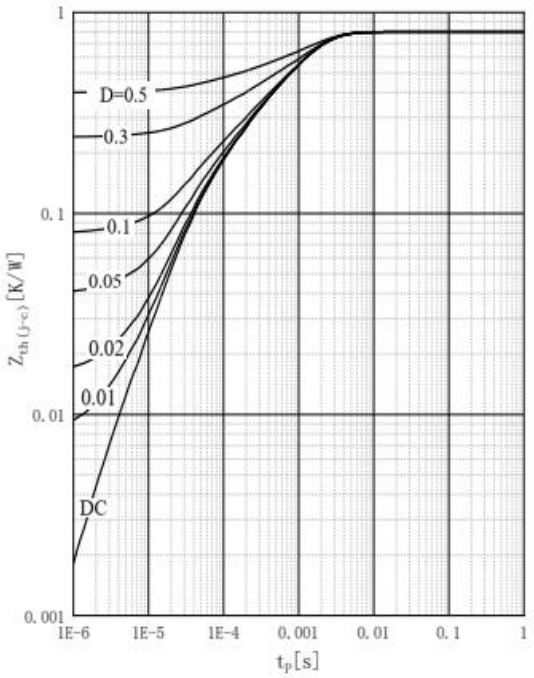
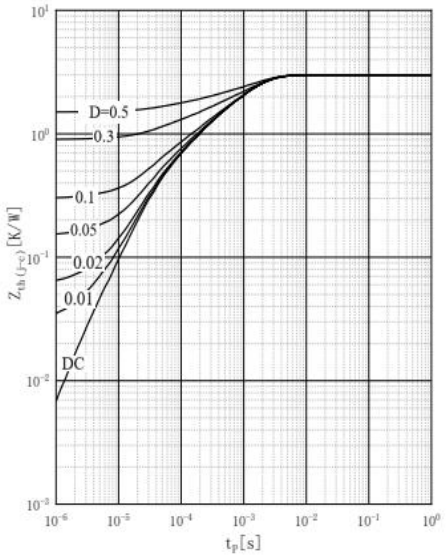
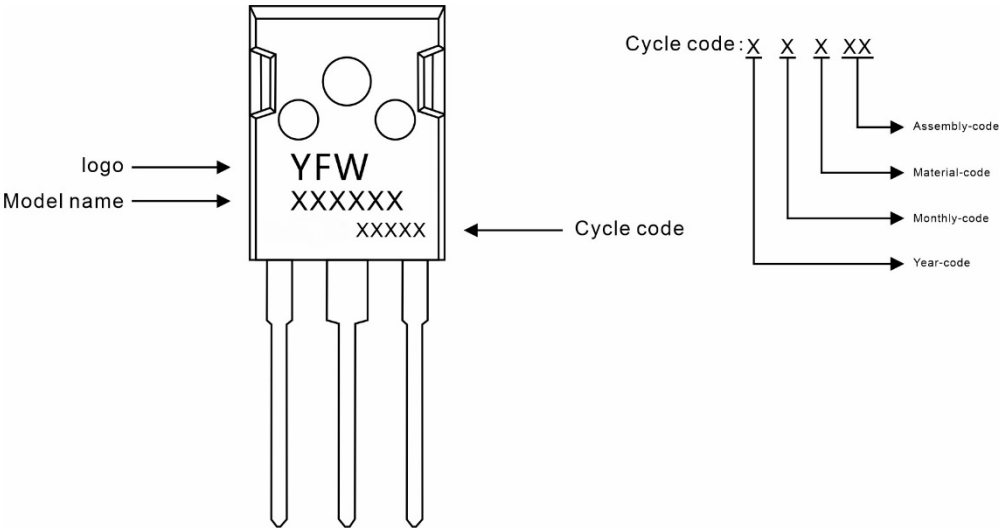


Fig. 23 Diode transient thermal impedance Z_{thjc}



Marking Diagram

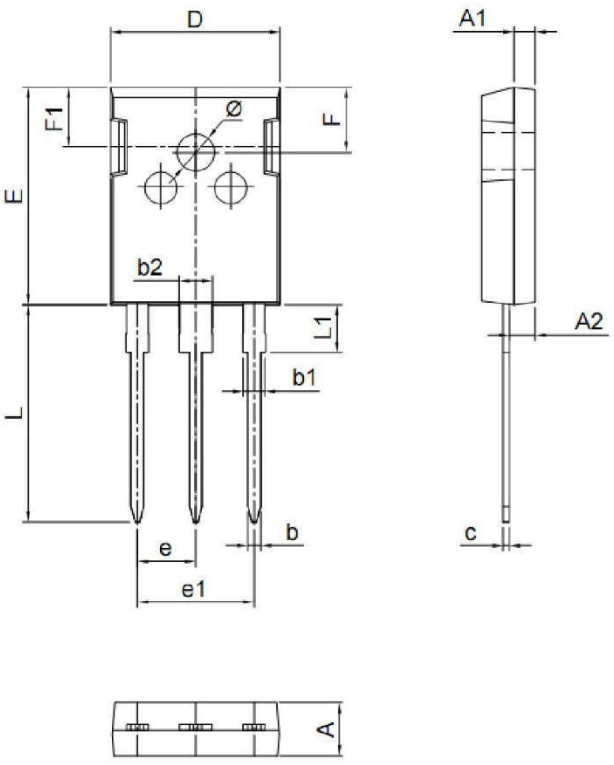


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWG25T135HAP	TO-247	0.209oz(5.93g)	30pcs/tube	600PCS/Box 2400PCS/Carton

Package Dimensions

TO-247



Symbol	Dimensions in mm		Dimensions in Inch	
	Min.	Max.	Min.	Max.
A	4.90	5.10	0.193	0.201
A1	1.90	2.10	0.075	0.083
A2	2.29	2.54	0.090	0.100
b	1.00	1.40	0.039	0.055
b1	2.00	2.20	0.079	0.087
b2	3.00	3.20	0.118	0.126
c	0.50	0.70	0.020	0.028
D	15.75	16.05	0.620	0.632
E	20.20	20.80	0.795	0.819
e	5.45 (BSC)		0.215 (BSC)	
e1	10.90 (BSC)		0.429 (BSC)	
F	6.05	6.25	0.238	0.246
F1	5.80	6.00	0.228	0.236
L	20.10	20.40	0.791	0.803
L1	4.05	4.35	0.159	0.171
Φ	3.50	3.70	0.138	0.146

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