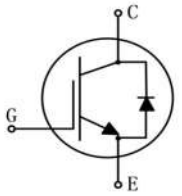
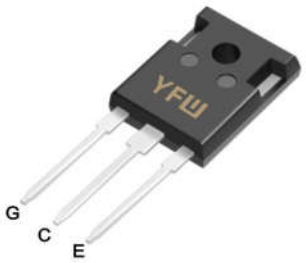
650V N-Channel Enhancement Mode Power IGBT

MAIN CHARACTERISTICS

$I_{C\ @TC=100℃}$	30A
V_{CE}	650V
VCE(sat)-typ	1.69V





TO-247

FEATURES

- Positive temperature coefficient
- Fast Switching
- Low VCE(sat)
- Reliable and Rugged
- Halogen Free and Green Devices Available

APPLICATIONS

- Motor drives
- Air Condition
- Inverters

MECHANICAL DATA

- Case: Molded plastic
- 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}	650	V
Gate-emitter voltage	V_{GES}	±30	V
Continuous collector current (TC=25℃)	I_C	60	A
Continuous collector current (TC=100℃)		30	A
Pulsed collector current, tp limited by Tvjmax	I_{CM}	90	A
Diode continuous forward current (TC=25℃)	I_F	60	A
Diode continuous forward current (TC=100℃)		30	A
Diode maximum current, tp limited by Tvjmax	I_{FM}	90	A
Operating junction temperature range	T_{vj}	-55 to +175	°C
Storage temperature range	T_{stg}	-55 to +175	°C

Thermal characteristics

Characteristics	Symbol	Values		Unit
		Typ	Max.	
Thermal resistance, junction to case for IGBT	$R_{th(j-c)}$	-	0.83	K/ W
Thermal resistance, junction to case for Diode	$R_{th(j-c)}$	-	0.65	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}	650	-	-	V
Collector-emitter leakage current	V_{CE}=650V, V_{GE}=0V	I_{CES}	-	-	10	μA
Gate leakage current, forward	V_{GE}=±20V, V_{CE}=0V	I_{GES}	-	-	±200	nA
Gate-emitter threshold voltage	V_{GE}=V_{CE}, I_C=1mA	$V_{GE(th)}$	4.3	5.3	6.3	V
Collector-emitter saturation voltage	V_{GE}=15 V, I_C=30A	$V_{CE(sat)}$	-	1.69	2	V
	V_{GE}=15V, I_C=30A, T_{vj}=125℃		-	1.9	-	V
	V_{GE}=15V, I_C=30A, T_{vj}=175℃		-	2.05	-	V
Input capacitance	V_{CE}=25V V_{GE}=0V f =1MHz	C_{ies}	-	1853	-	pF
Output capacitance		C_{oes}	-	72	-	pF
Reverse transfer capacitance		C_{res}	-	55	-	pF
Total gate charge	V_{CC}=520V V_{GE}=15V I_C=30A	Q_g	-	98	-	nC
Gate- Emitter Charge		Q_{ge}	-	18	-	nC
Gate- Collector Charge		Q_{gc}	-	47	-	nC
Short circuit collector current Max.1000 short circuits, times between short circuits: ≥ 1.0s	V_{GE}=15V, V_{CC}≤400V T_J≤175°C	t(SC)	-	8	-	μs
Turn-on delay time	V_{CC}=400V V_{GE}=15V I_C=30A R_G=5Ω Inductive load	td(on)	-	16	-	ns
Rise time		tr	-	46	-	ns
Turn-off delay time		td(off)	-	72	-	ns
Fall time		tf	-	80	-	ns
Turn-on energy		Eon	-	0.52	-	mJ
Turn-off energy		Eoff	-	0.77	-	mJ
Total switching energy		Ets	-	1.29	-	mJ
Turn-on delay time	V_{CC}=400V V_{GE}=15V I_C=30A R_G=5Ω Inductive load Tvj =175℃	td(on)	-	18	-	ns
Rise time		tr	-	54	-	ns
Turn-off delay time		td(off)	-	90	-	ns
Fall time		tf	-	75	-	ns
Turn-on energy		Eon	-	0.97	-	mJ
Turn-off energy		Eoff	-	1.36	-	mJ
Total switching energy		Ets	-	2.33	-	mJ
Diode forward voltage	I_F=30A	VF	-	2	2.3	V
	I_F=30A,Tvj=125℃		-	1.7	-	V
	I_F=30A,Tvj=175℃		-	1.5	-	V
Diode reverse recovery time	I_F=30A diF/dt=-200A/μs	trr	-	48	-	ns
Diode peak reverse recovery current		Irrm	-	5.1	-	A
Diode reverse recovery charge		Qrr	-	80	-	nC
Diode reverse recovery time	I_F=30A diF/dt=-200A/μsTvj=175℃	trr	-	39	-	ns
Diode peak reverse recovery current		Irrm	-	8.5	-	A
Diode reverse recovery charge		Qrr	-	127	-	nC

RATINGS AND CHARACTERISTIC CURVES

Figure 1: Power Dissipation

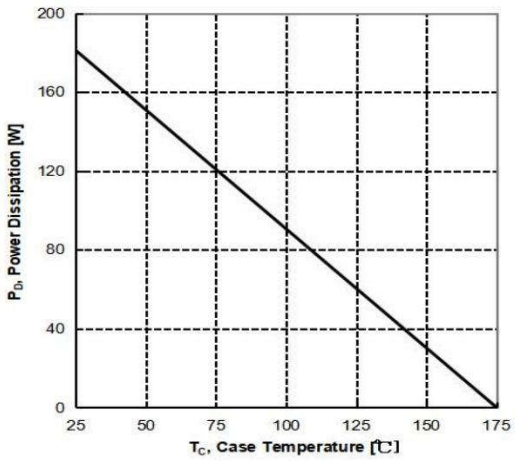


Figure 2: Collector Current vs. Case Temperature

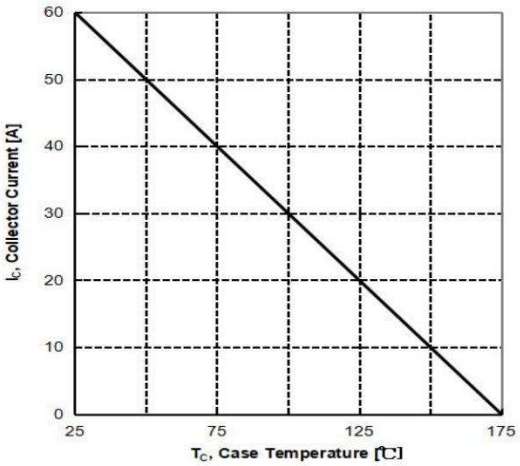


Figure 3: Safe Operation Area

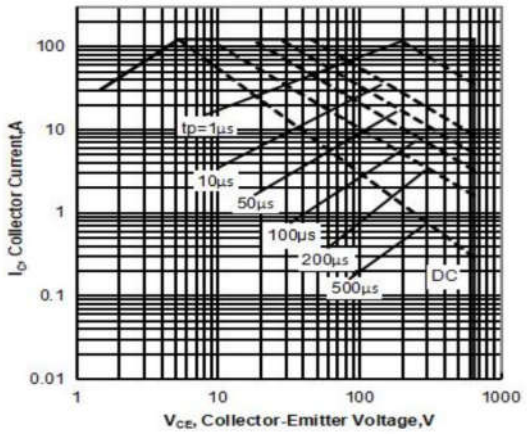


Figure 4: Typical Transfer Characteristics

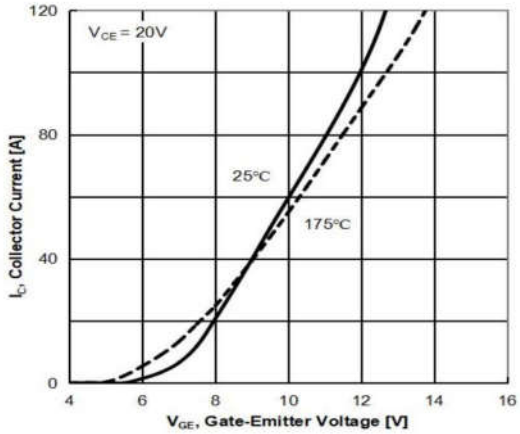


Figure 5: Typical Output Characteristics

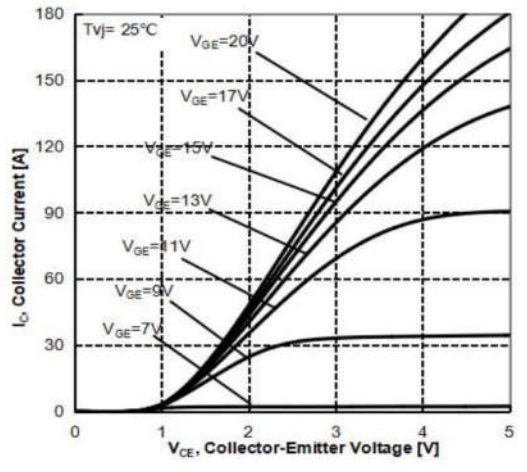
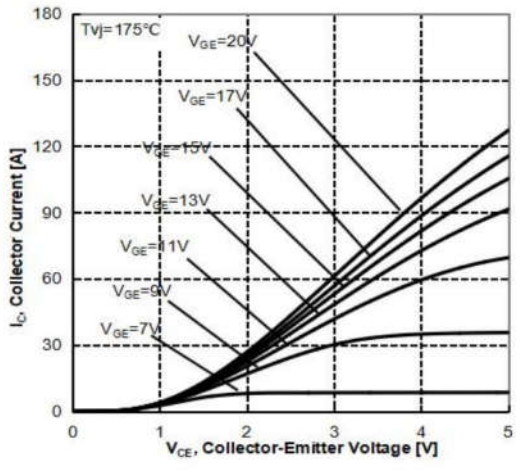


Figure 6: Typical Output Characteristics



RATINGS AND CHARACTERISTIC CURVES

Figure 7: Typical Collector-Emitter Saturation Voltage vs. Junction Temperature

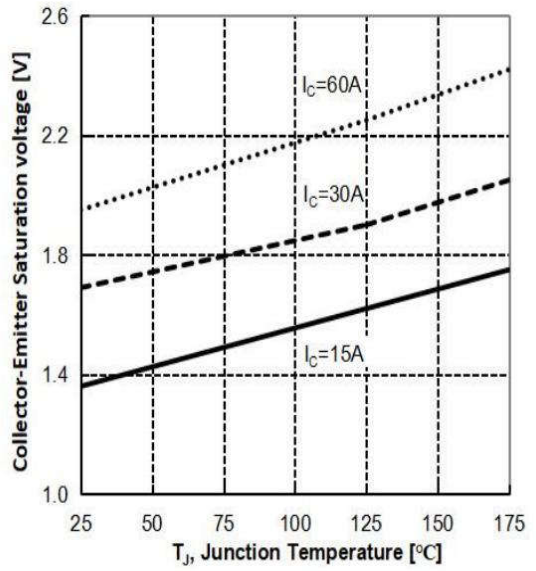


Figure 8: Typical Gate-Emitter Threshold Voltage vs. Junction Temperature

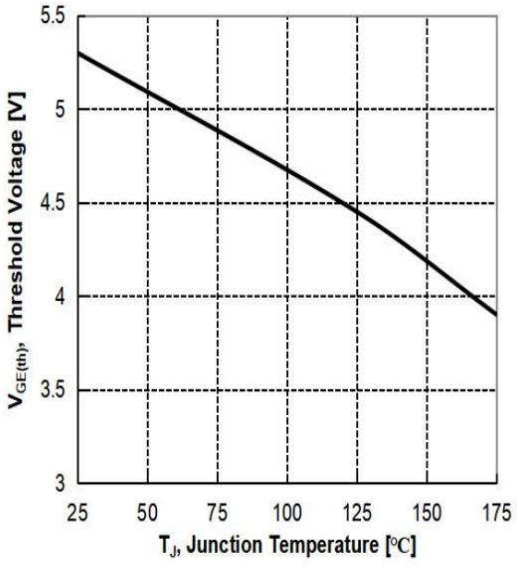


Figure 9: Typical Switching Times vs. Gate Resistor (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V, I_C=30A)

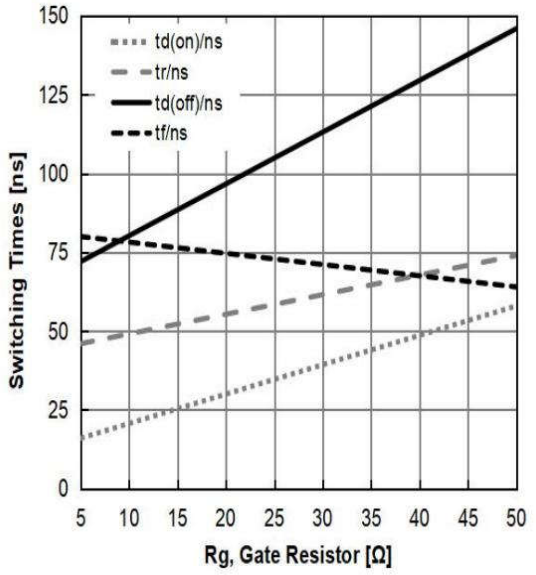
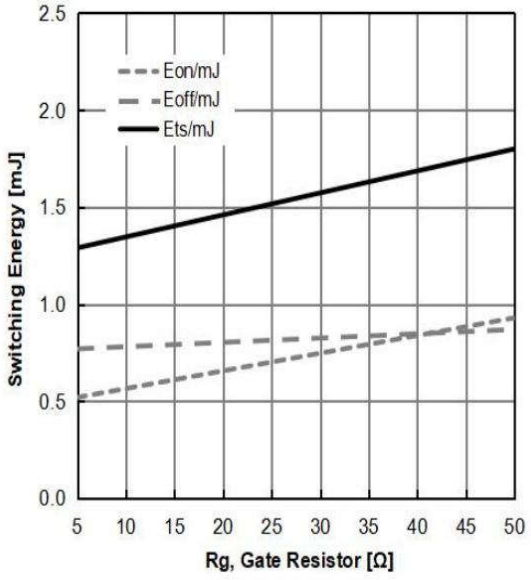


Figure 10: Typical Switching Energy vs. Gate Resistor (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V, I_C=30A)



RATINGS AND CHARACTERISTIC CURVES

Figure 11: Typical Switching Times vs. Junction Temperature (V_{CE}=400V, V_{GE}=15/0V, I_C=30A)

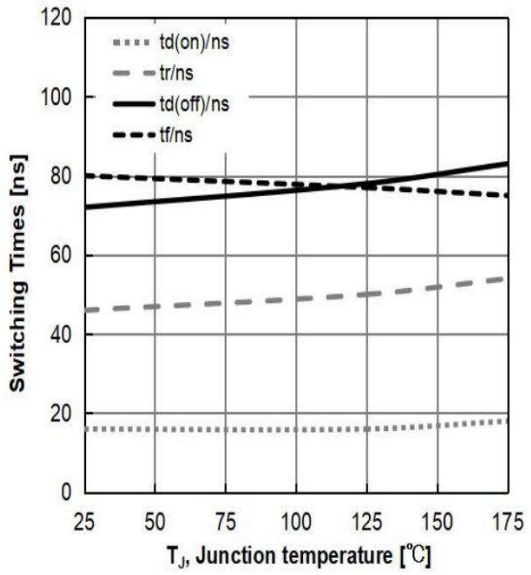


Figure 12: Typical Switching Energy vs. Junction Temperature (V_{CE}=400V, V_{GE}=15/0V, I_C=30A)

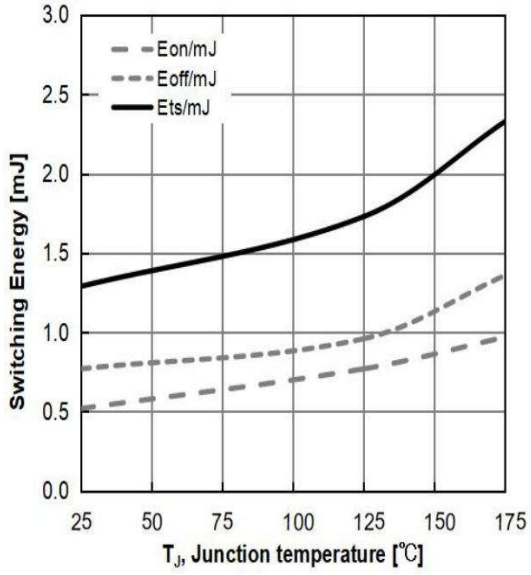


Figure 13: Typical Switching Times vs. Collector Current (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V)

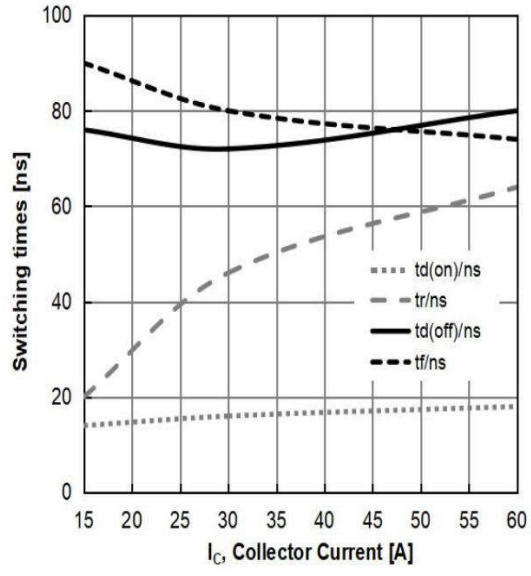
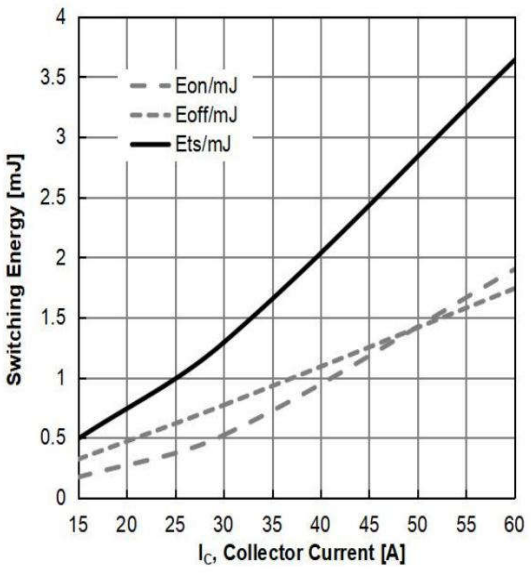


Figure 14: Typical Switching Energy vs. Collector Current (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V)



RATINGS AND CHARACTERISTIC CURVES

Figure 15: Typical Switching Times vs. VCE (T_J=25℃,V_{GE}=15/0V, I_C=30A)

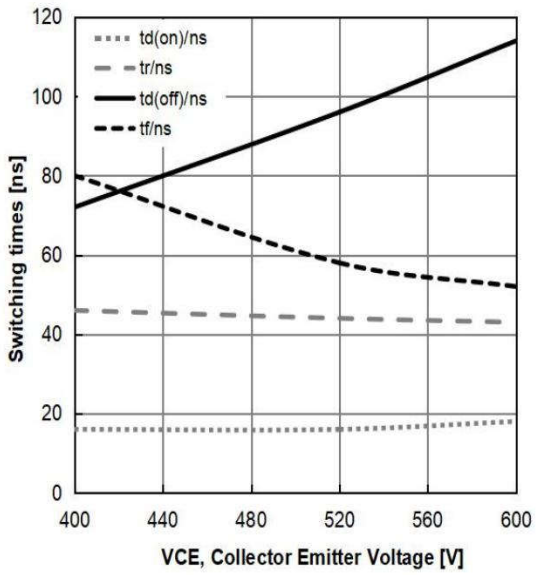


Figure 16: Typical Switching Energy vs. VCE (T_J=25℃, V_{GE}=15/0V, I_C=30A)

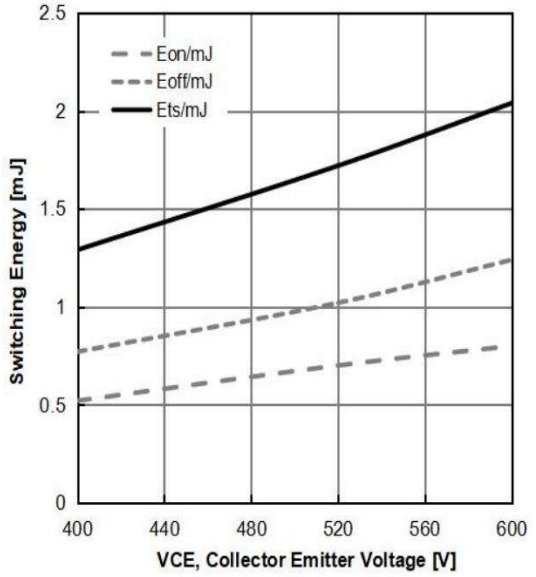


Figure 17: Typical Gate Charge

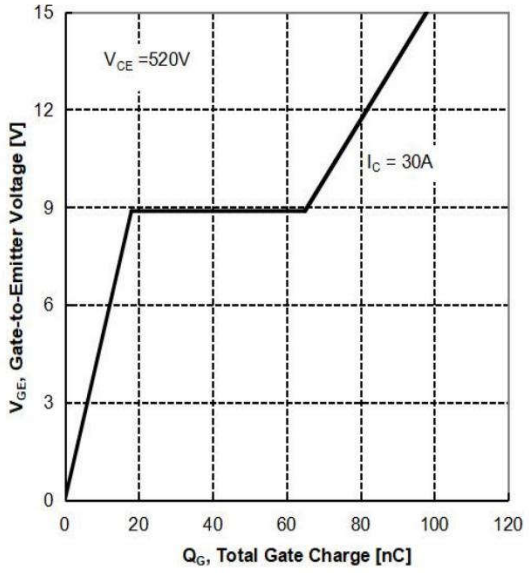
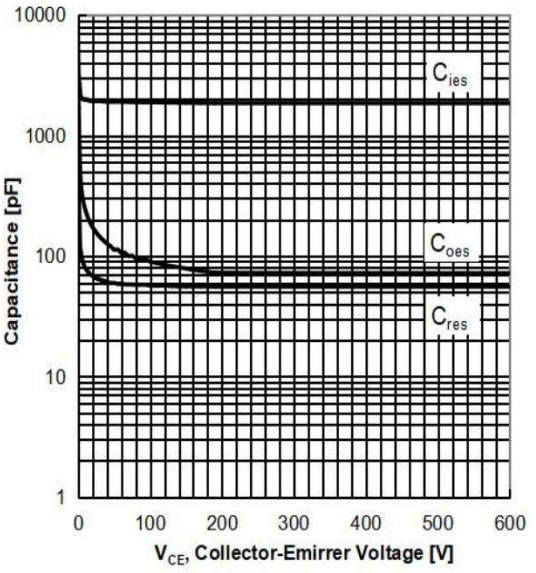


Figure 18: Typical Capacitance vs. Collector- Emitter Voltage



RATINGS AND CHARACTERISTIC CURVES

Figure 19: IGBT Transient Thermal Impedance vs. Pulse Width

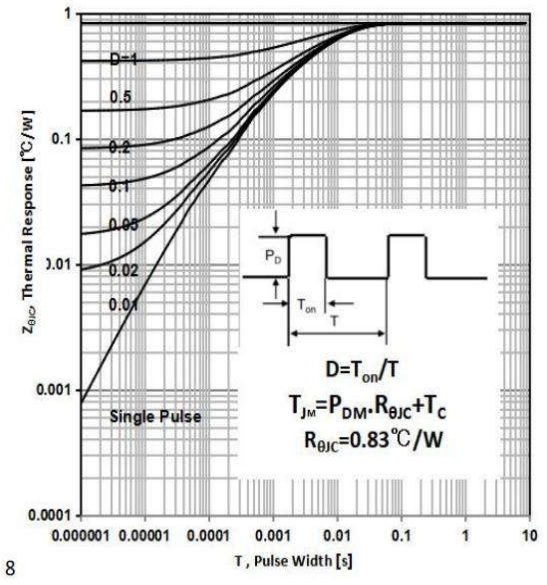


Figure 20: Diode Transient Thermal Impedance vs. Pulse Width

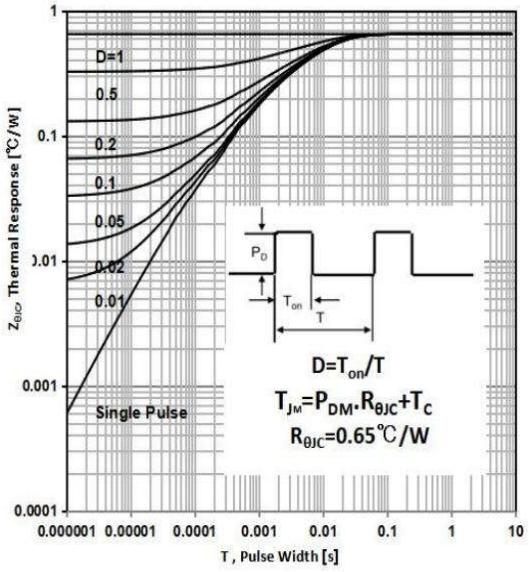
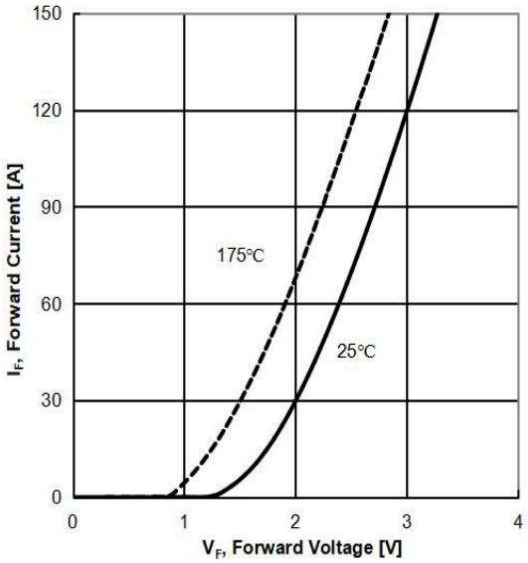
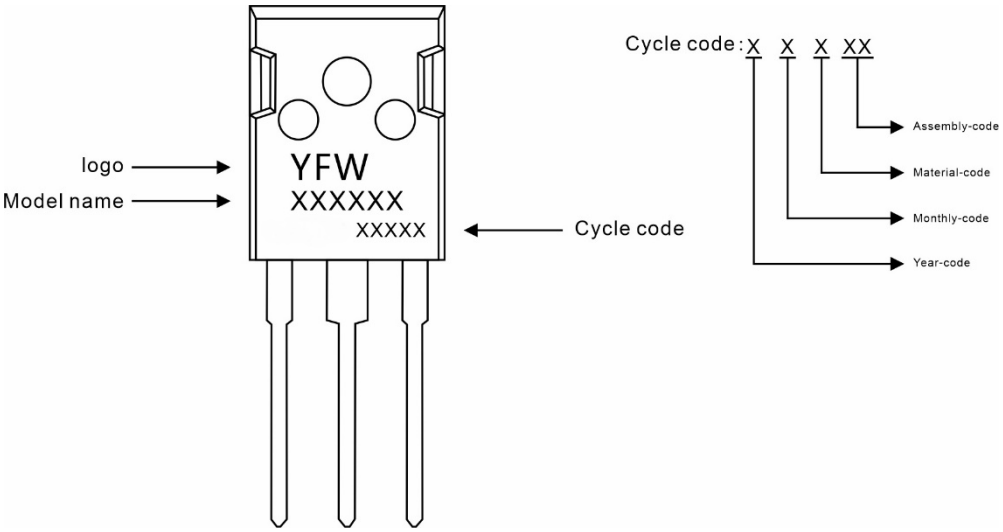


Figure 21: Typical Diode Forward Current vs. Forward Voltage



Marking Diagram

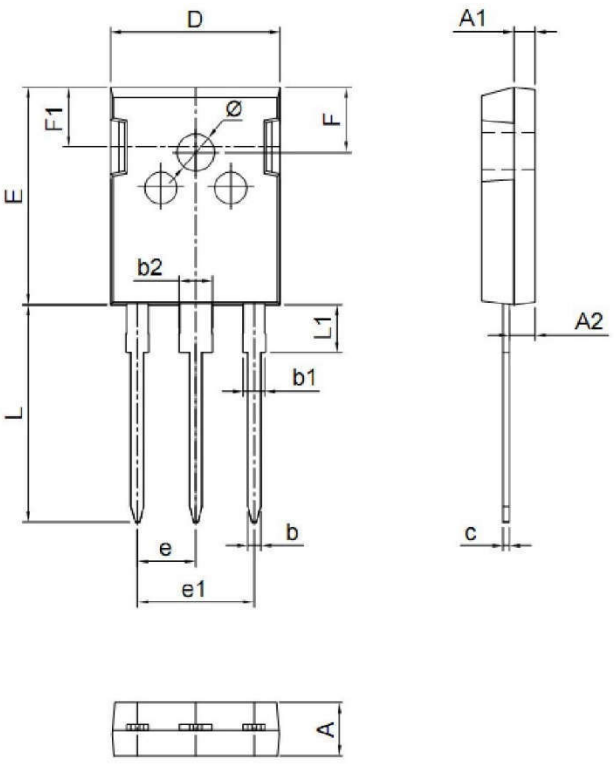


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWG30T65HAP	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

Disclaimer

The information presented in this document is for reference only. GuangDong Youfeng Microelectronics Co.,Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise. The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices),YFW or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale. This publication supersedes & replaces all information previously supplied. For additional information, please visit our website https://www.yfwdiode.com, or consult YFW sales office for further assistance.