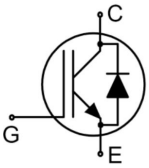
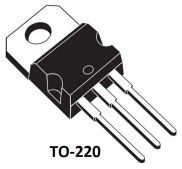
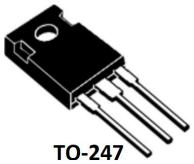
Features

- Low gate charge
- Trench FS Technology,
- saturation voltage: $V_{CE(sat)}$, typ =1.6V,IC=20A and TC =25°C
- RoHS product







Applications

- General purpose inverters
- UPS

Absolute Ratings（Tc=25℃）

Parameter	Symbol	MSG20T65FQS	MSG20T65FQT	MSG20T65FQC	Unit
Collector-Emmiter Voltage	Vces	650			V
Collector Current-continuous	Ic T=25℃	40			A
	T=100℃	20			A
Collector Current-pulse(note 1)	I_{CM}	80			A
Diode RMS forward current	I_F T=25℃	40			A
	T=100℃	20			A
Gate-Emmiter Voltage	V_{GES}	±20			V
Turn-off safe area	-	180			A
Surge non repetitive forward current tp=10ms sinusoidal	I_{FSM}	80			A
Power Dissipation	P_D T_C=25℃	156	35	162	W
Diode Forward Current	T_C=100℃	20			A
Operating and Storage Temperature Range	T_J,T_{STG}	-55~+150			℃
Maximum Lead Temperature for Soldering Purposes	T_L	300			℃

*Collector current limited by maximum Junction temperature

Thermal Characteristic

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emmiter Voltage	BV_{CES}	I_C=500μA,V_{GE}=0V	650	-	-	V

Breakdown Voltage Temperature Coefficient	$\triangle BV_{CES}/\triangle T_J$	I_C=1mA,referenced to 25℃	-	0.5	-	V/℃
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V,V_{GE}=0V, T_C=25℃	-		10	μA
Gate-body leakage current	I_{GESF}	V_{CE}=0V,V_{GE}=±20V	-	-	200	nA
On-Characteristics						
Gate-Emmiter Threshold Voltage	$V_{GE(th)}$	VCE=VGE, Ic=250uA	4.5	-	6.5	V
Collector-Emmiter saturation Voltage	V_{CESAT}	V_{GE}=15V,I_C=20A, T_C=25℃	-	1.6	2.0	V
		Tc=125℃		1.75	2.15	
		T_C=175℃		1.9	2.3	
Short Collector current (Note 2)	Ic(sc)	VGE=15V VCE=360V tsc< 10us Tc=25℃		116.7		A
Dynamic Characteristics						
Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ, Tc=25℃	-	1500	-	pF
Output capacitance	Coes		-	128	-	pF
Reverse transfer capacitance	Cres		-	28.7	-	pF
Switching Characteristics						
Turn-On delay time	t_d(on)	V_{CE}=400V,Ic=20A, R_G=10Ω,V_{GE}=15V Tc=25℃ Inductive Load	-	16	-	ns
Turn-On rise time	t_r		-	56	-	ns
Turn-off delay time	t_d(off)		-	52	-	ns
Turn-off Fall time	t_f		-	82	-	ns
Turn-on energy	E_{on}		-	0.79	-	mJ
Turn-off energy	E_{off}		-	0.3	-	mJ
Total switching Energy	E_{total}		-	1.09	-	mJ
Total Gate Charge	Qg	VCE=400V,Ic=20A R_G=10Ω,VGE=15V (note3,4)	-	43.9	-	nC
Anti-Paraller Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_F	V_{GE}=0V,I_F=20A. T_C=25℃	-	1.4	-	V
		V_{GE}=0V,I_F=20A. T_C=175℃	-	1.0	-	V

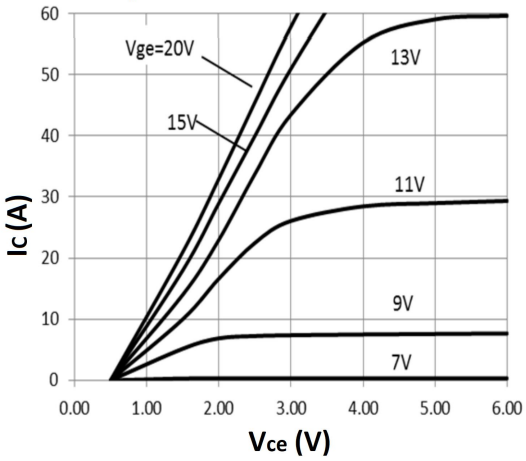
Diode Reverse recovery time	t_{rr}	VGE=0V, IF=20A dI=/dt=100A/us (note 4)	-	254	-	ns
Reverse recovery charge	Q_{rr}		-	347	-	uC
Diode Reverse recovery Current	Irrm		-	2.7	-	A

Parameter	Symbol	MSG20T65 FQS	MSG20T65 FQT	MSG20T65 FQC	Unit
IGBT Thermal Resistance,Junction to Case	$R_{th(j-c)}$	3.57	0.77	0.77	℃/W
FRD Thermal Resistance,Junction to Case	$R_{th(j-c)}$	7.7	2.05	2.05	℃/W
Thermal Resistance,Junction to Ambitent	$R_{th(j-A)}$	62.5	62.5	33.8	℃/W

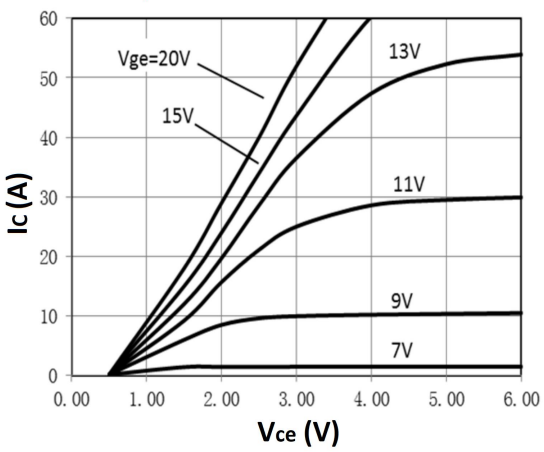
type	Package
MSG20T65FQS	**TO-220F**
MSG20T65FQT	**TO-220**
MSG20T65FQC	**TO-247**

Electrical Characteristics(curves)

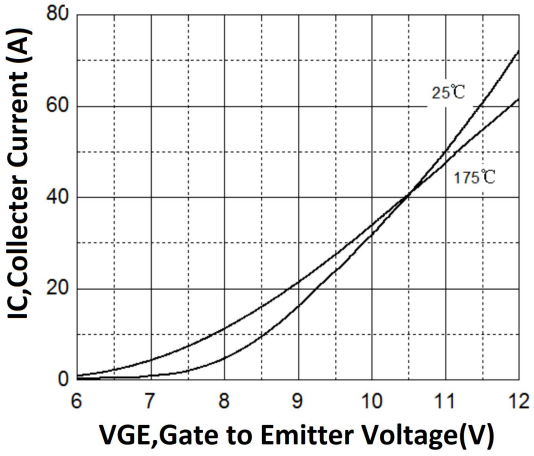
Output Charateristics T_J=25℃



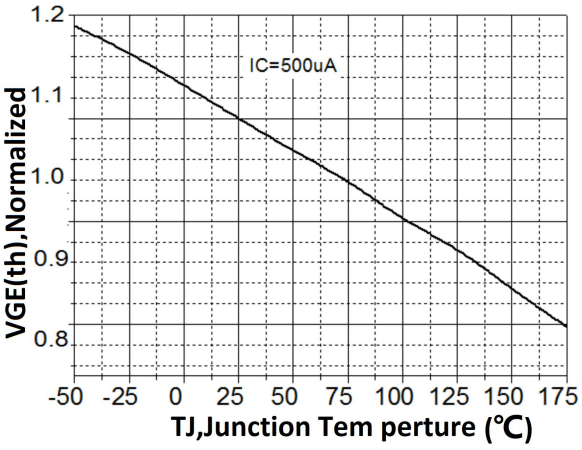
Output Charateristics T_J= 175℃



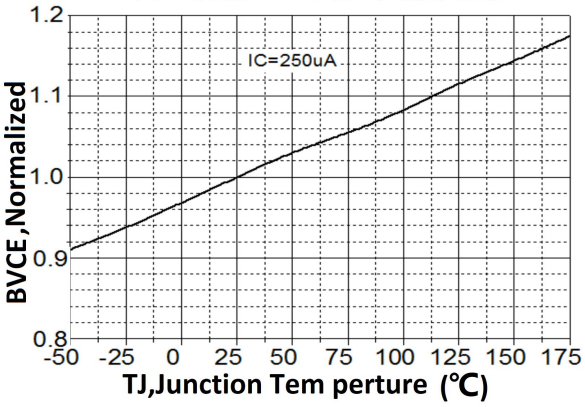
Transfer Characteristics V_{CE}=6V



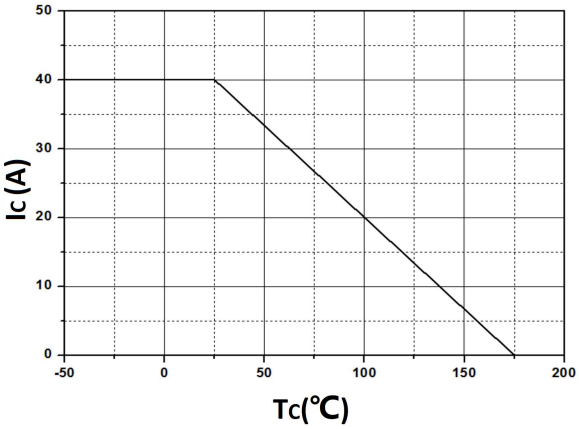
归一化的V_{GE}与T_J关系曲线



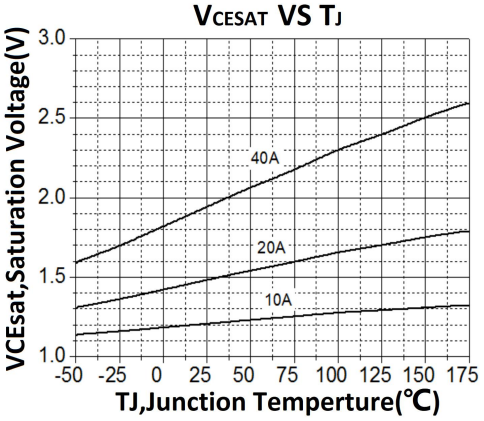
归一化的BV_{CE}与T_J关系曲线



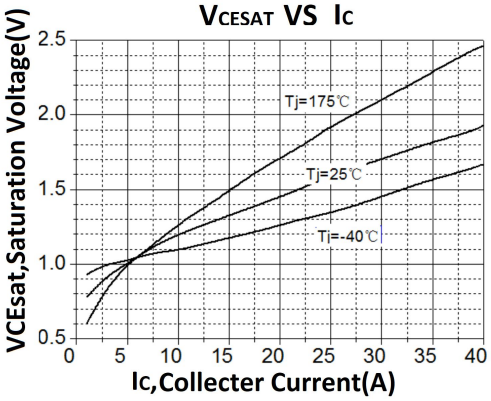
I_C VS T_C



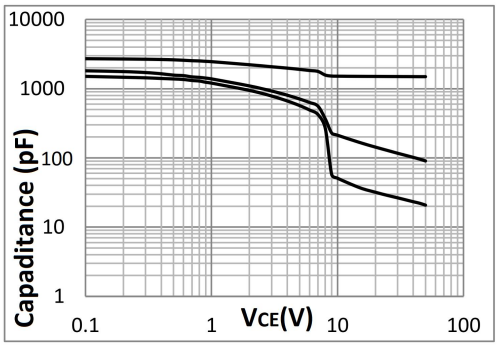
VCESAT VS TJ



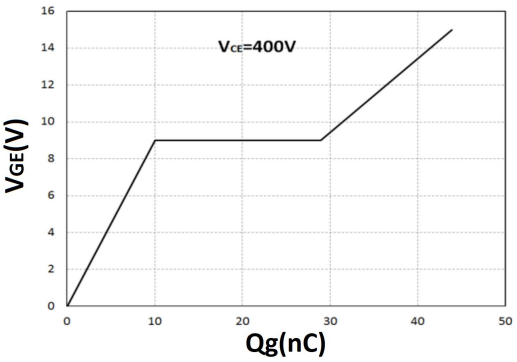
VCESAT VS IC



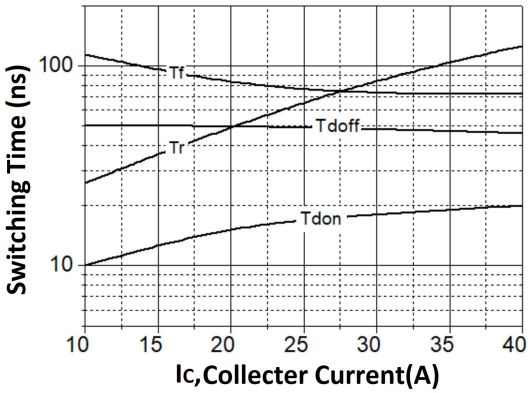
Capacitance Characteristice
VGE=0V,f=1.0MHZ



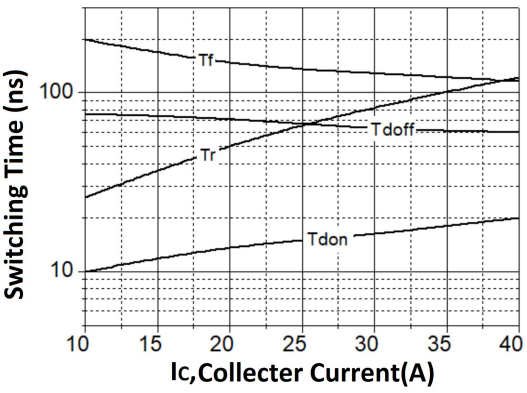
Qg VS VGE



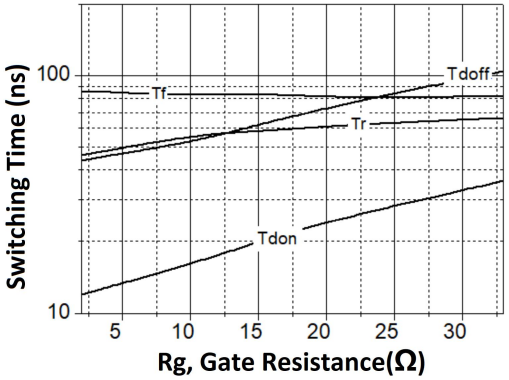
SwitchingTime VS.IC
TJ=25℃,VGE=15V,VCE=400V,Rg=10Ω



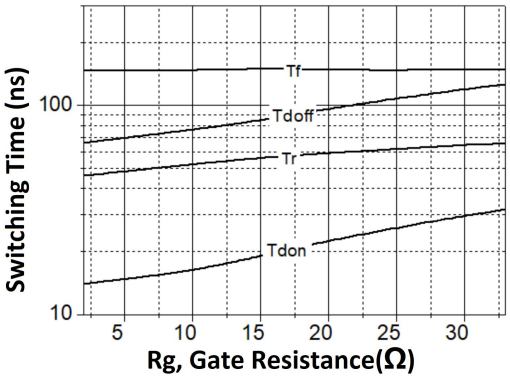
SwitchingTime VS.IC
TJ=175℃,VGE=15V,VCE=400V,Rg=10Ω



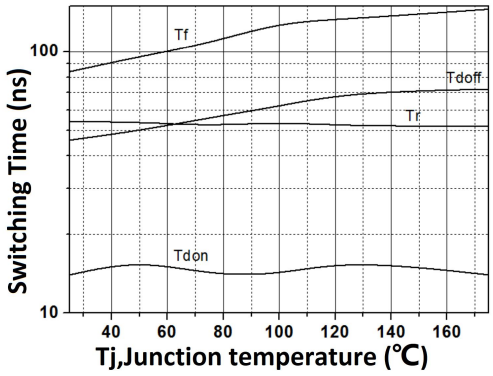
SwitchingTime VS. Rg
TJ=25℃,VGE=15V,VCE=400V, IC=20A



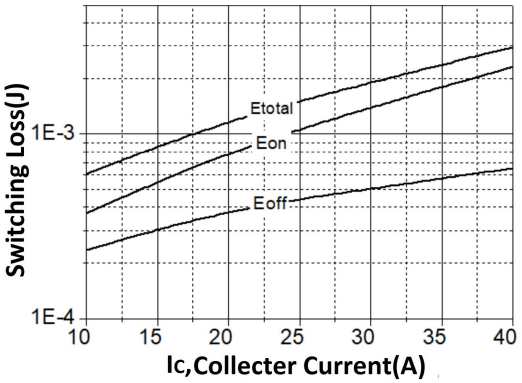
SwitchingTime VS. Rg
TJ=175℃,VGE=15V,VCE=400V, IC=20A



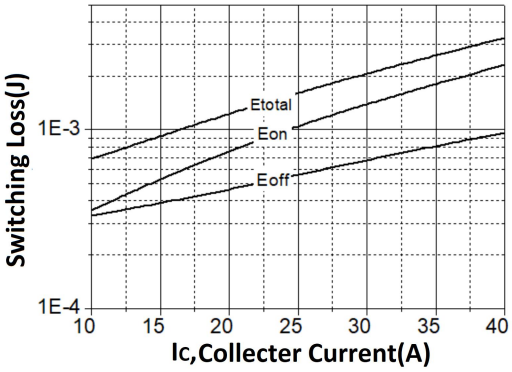
Switching Time VS. TJ



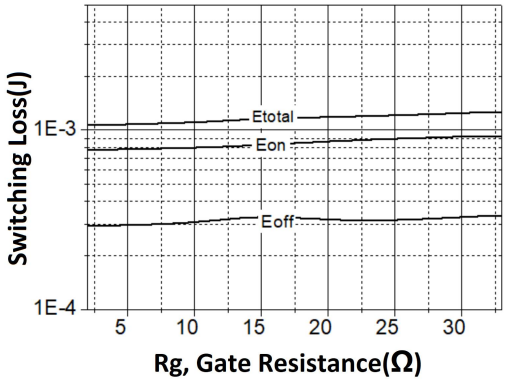
Switching Loss VS. IC
TJ=25℃,VGE=15V,VCE=400V,Rg=10Ω



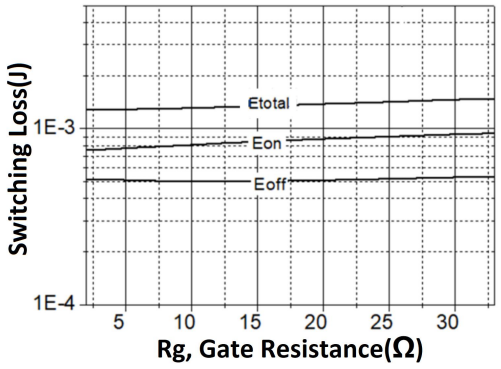
Switching Loss VS. IC
TJ=175℃,VGE=15V,VCE=400V,Rg=10Ω



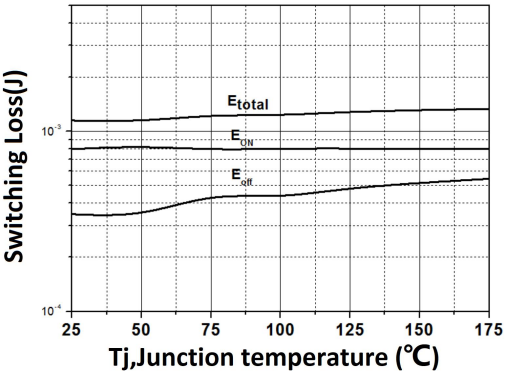
Switching Loss VS.Rg
TJ=25℃,VGE=15V,VCE=400V, IC=20A



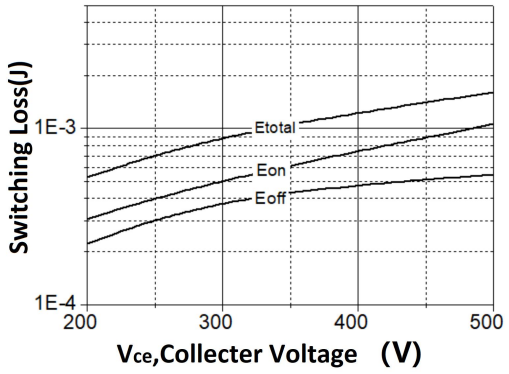
Switching Loss VS.Rg
T_J=175℃,V_{GE}=15V,V_{CE}=400V, I_C=20A



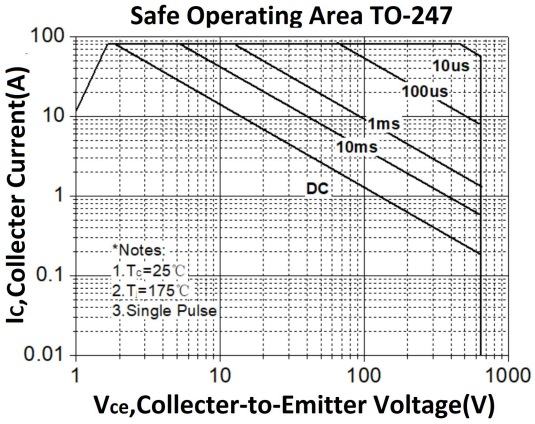
Switching Loss VS. T_J
V_{GE}=15V,V_{CE}=400V, I_C=20A,R_g=10Ω



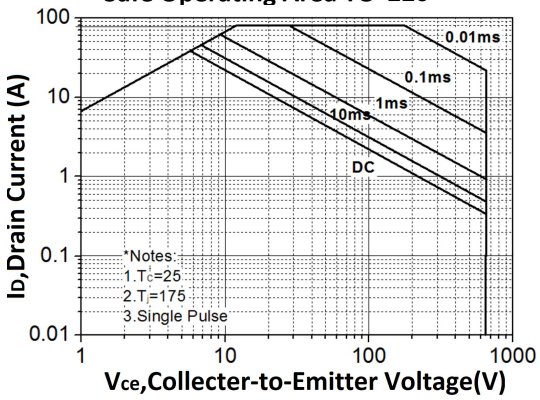
Switching Loss VS. $V_{CE(V)}$
T_J=175℃,V_{GE}=15V, I_C=20A ,R_g=10Ω



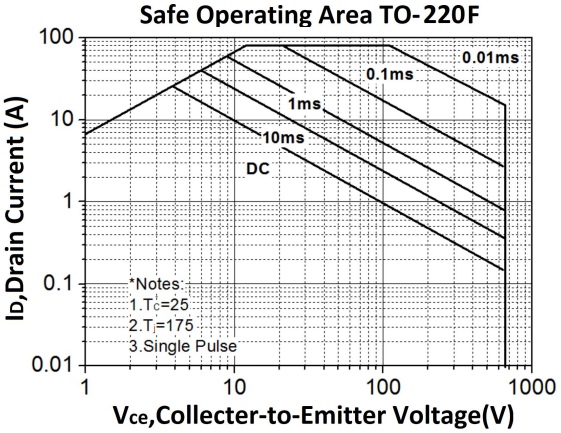
Safe Operating Area TO-247



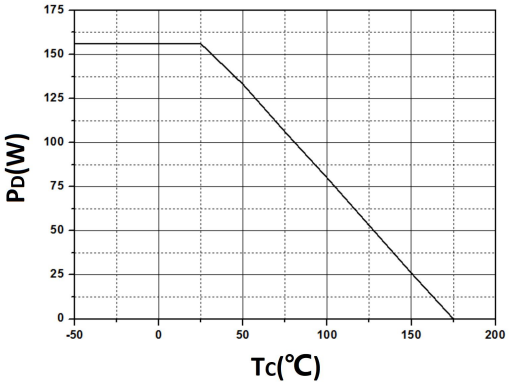
Safe Operating Area TO-220



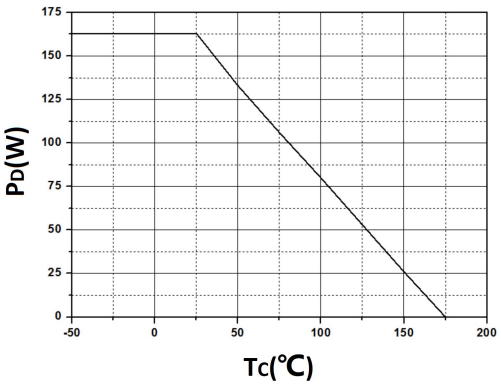
Safe Operating Area TO-220F



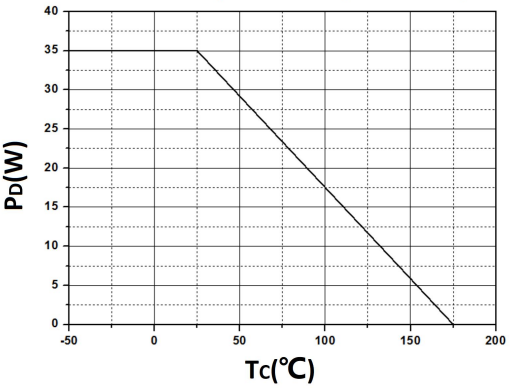
PD VS temperature (TO-220)



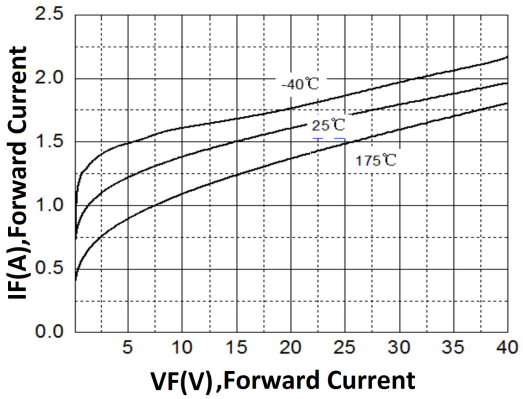
PD VS temperature (TO-247)



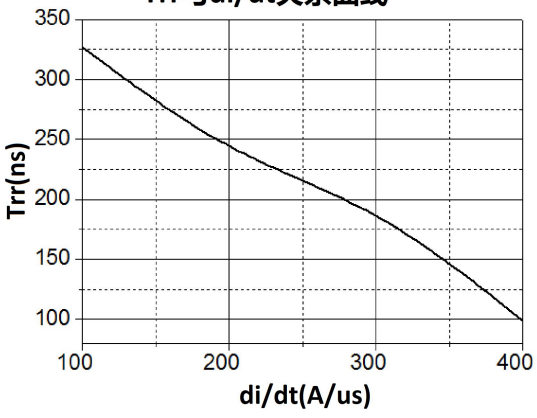
PD VS temperature (TO-220F)



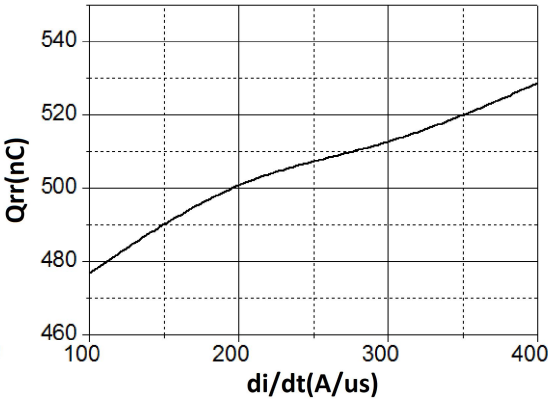
Diode Characteristice



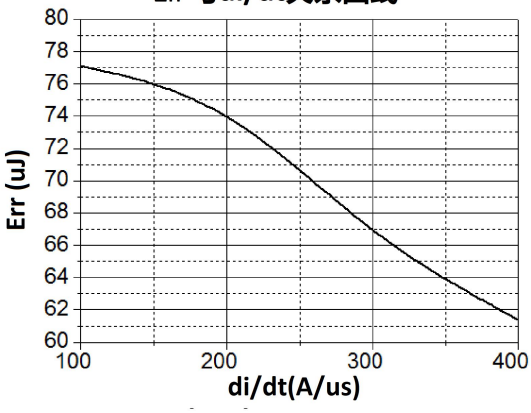
Trr与di/dt关系曲线



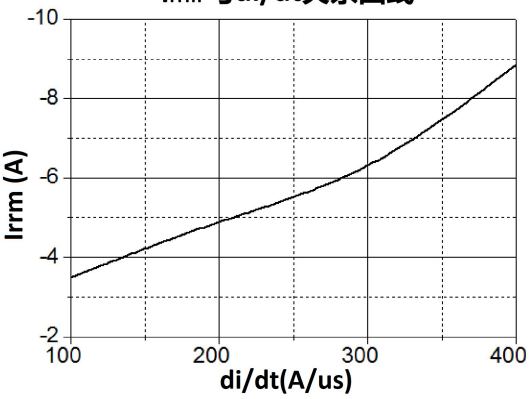
Qrr与di/dt关系曲线



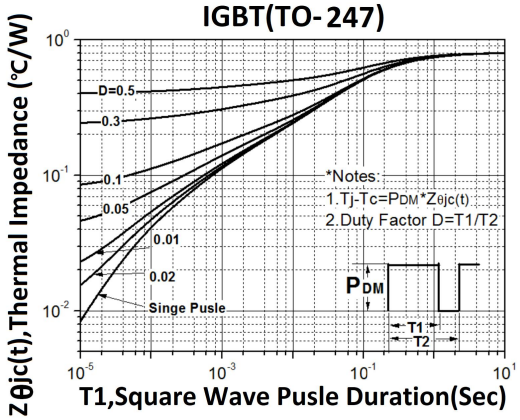
Err 与di/dt关系曲线



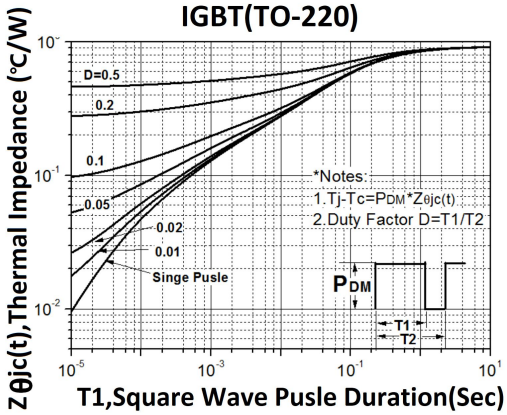
Irrm 与di/dt关系曲线



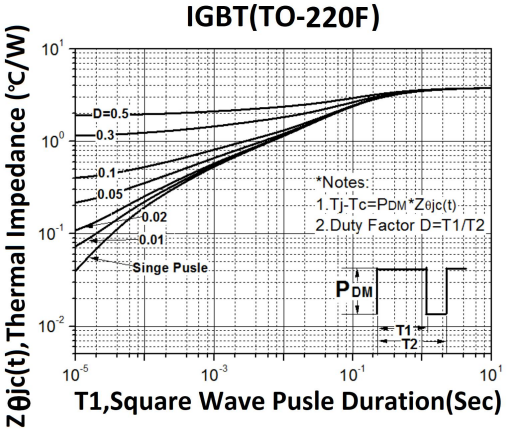
Normalized Maximum Transient Thermal Impedance for IGBT(TO-247)



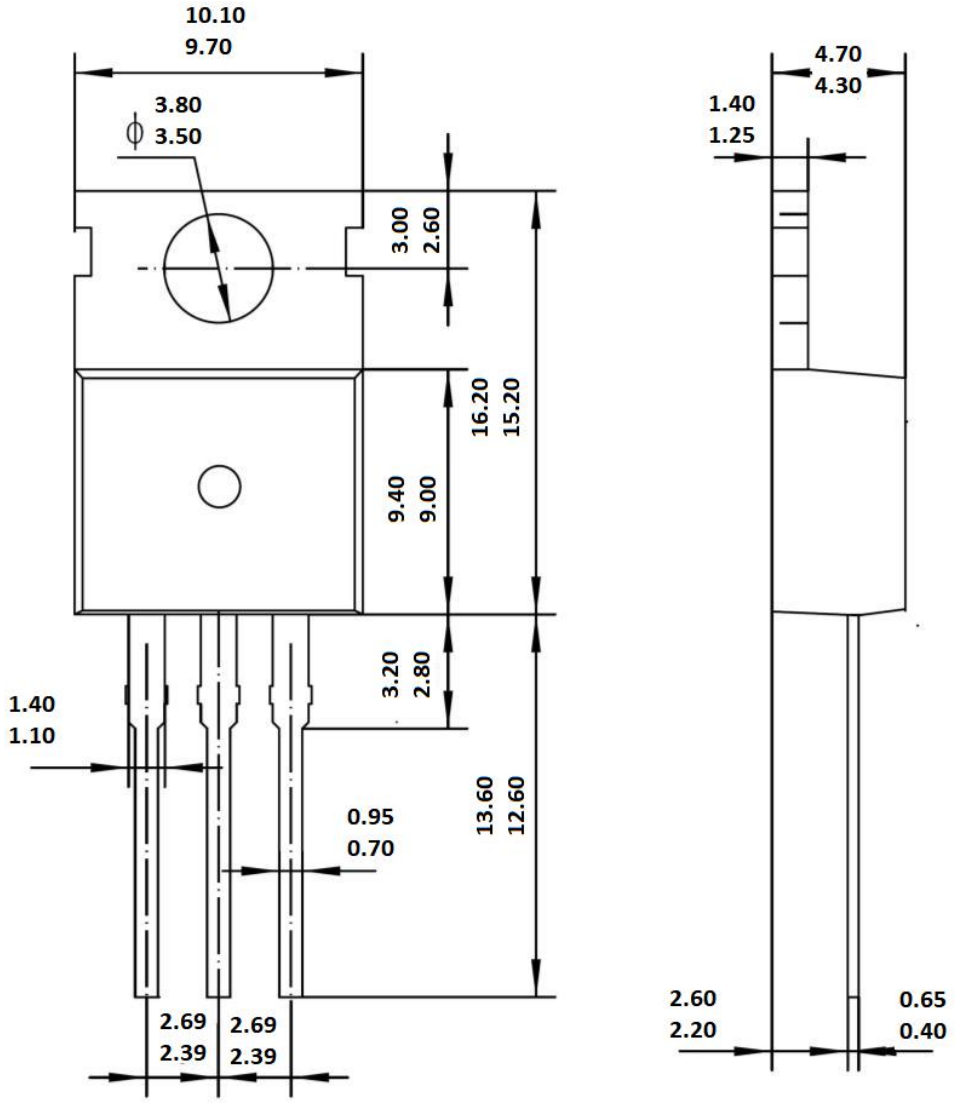
Normalized Maximum Transient Thermal Impedance for IGBT(TO-220)

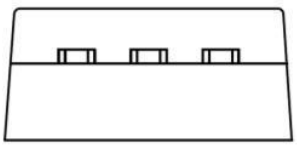


Normalized Maximum Transient Thermal Impedance for IGBT(TO-220F)



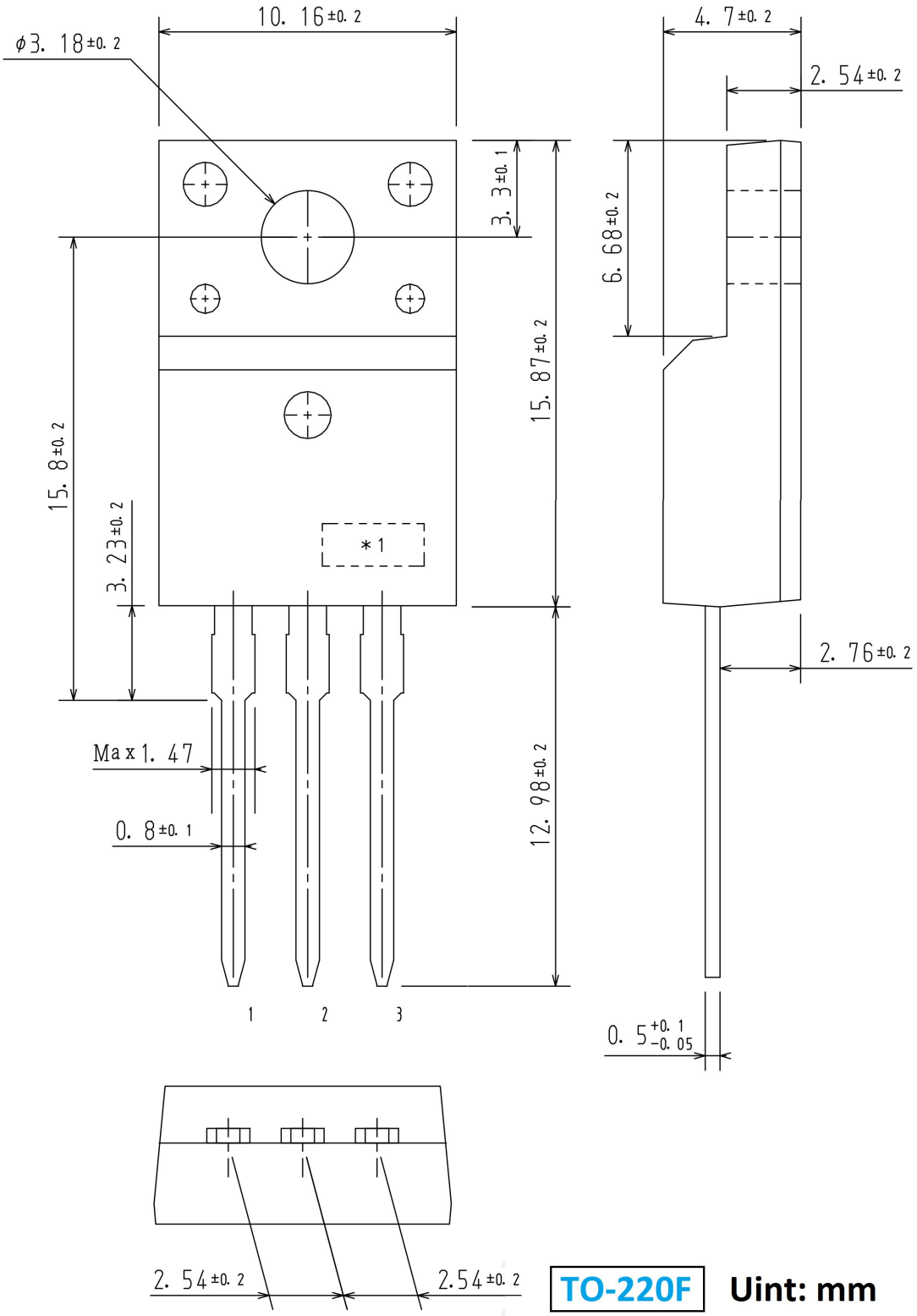
Package Mechanical DATA



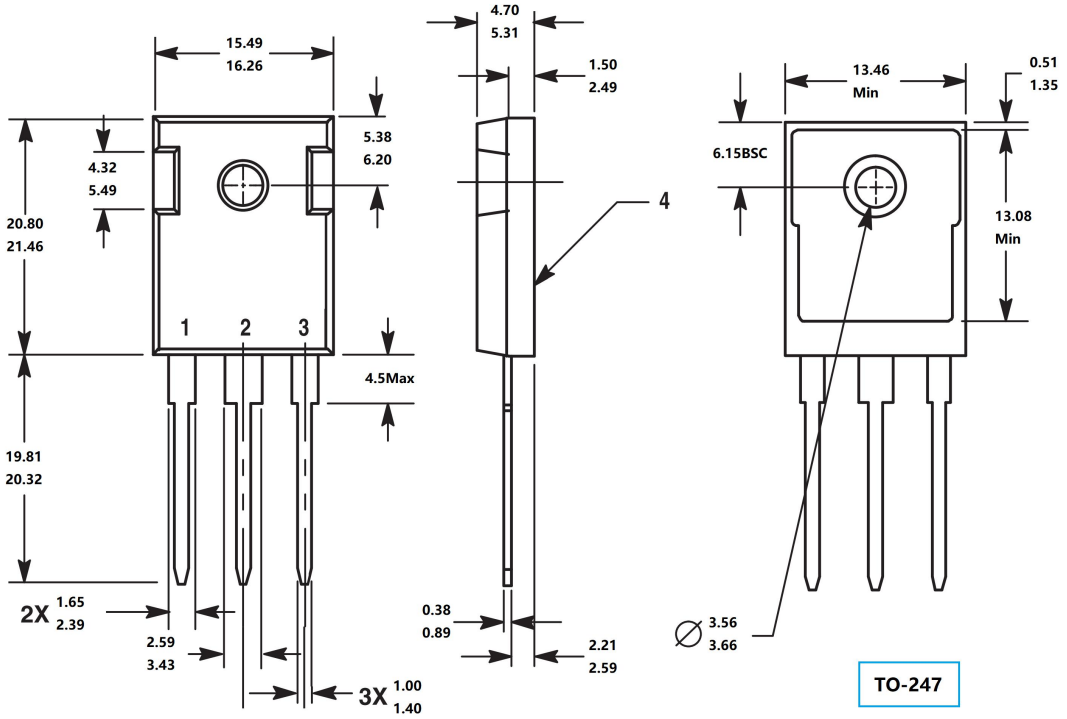


TO-220

Unit: mm



TO-220F **Uint: mm**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16.26
4.70
5.31
1.50
2.49
13.46
Min
0.51
1.35
5.38
6.20
4.32
5.49
6.15BSC
20.80
21.46
4
13.08
Min
1
2
3
4.5Max
19.81
20.32
2X 1.65
2.39
2.59
3.43
3X 1.00
1.40
0.38
0.89
2.21
2.59
∅ 3.56
3.66
TO-247