

Features

- Low gate charge
- Trench FS Technology,
- saturation voltage: $V_{CE(sat)}$,
typ = 1.6V, $I_C=20A$ and $T_C=25^\circ C$
- RoHS product

Applications

- General purpose inverters
- UPS

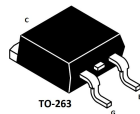
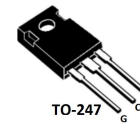
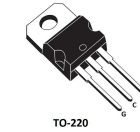
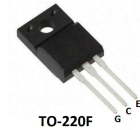
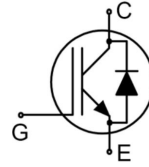
Absolute Ratings ($T_C=25^\circ C$)

Parameter	Symbol	SL20T65F	SL20T65 / SL20N65FZ	SL20T65FL	Unit
Collector-Emmitter Voltage	V_{CES}	650			V
Collector Current-continuous	I_C $T=25^\circ C$ $T=100^\circ C$	40			A
		20			A
Collector Current-pulse(note 1)	I_{CM}	80			A
Diode RMS forward current	I_F $T=25^\circ C$ $T=100^\circ C$	40			A
		20			A
Gate-Emmitter 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 $T_C=25^\circ C$	35	156	162	W
Diode Forward Current	$T_C=100^\circ C$	20			A
Storage Temperature Range	T_{STG}	$-55 \sim +150$			$^\circ C$
Operating Temperature Range	T_J	$-55 \sim +175$			$^\circ C$
Maximum Lead Temperature for Soldering Purposes	T_L	300			$^\circ C$

*Collector current limited by maximum Junction temperature

Thermal Characteristic

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emmitter Voltage	BV_{CES}	$I_C=500\mu A, V_{GE}=0V$	650	-	-	V



Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	Ic=1mA,referenced to 25°C	-	0.5	-	V/°C
Zero Gate Voltage Collector Current	ICES	VCE=650V,VGE=0V, TC=25°C	-		10	µA
Gate-body leakage current	IGES	VCE=0V,VGE=± 20V	-	-	±200	nA
On-Characteristics						
Gate-Emmitter Threshold Voltage	VGE(th)	VCE=VGE, Ic=250uA	4.5	-	6.5	V
Collector-Emmitter saturation Voltage	VCESAT	VGE=15V,Ic=20A, TC=25°C	-	1.6	2.0	V
		TC=125°C		1.75	2.15	
		TC=175°C		1.9	2.3	
Short Collector current (Note 2)	Ic(sc)	VGE=15V VCE=360V tsc< 10us TC<=25°C		116.7		A
Dynamic Characteristics						
Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ, TC=25°C	-	1500	-	pF
Output capacitance	Coes		-	128	-	pF
Reverse transfer capacitance	Cres		-	28.7	-	pF
Switching Characteristics						
Turn-On delay time	td(on)	VCE=400V,Ic=20A, RG=10Ω,VGE=15V TC=25°C Inductive Load	-	16	-	ns
Turn-On rise time	tr		-	56	-	ns
Turn-off delay time	td(off)		-	52	-	ns
Turn-off Fall time	tf		-	82	-	ns
Turn-on energy	Eon		-	0.79	-	mJ
Turn-off energy	Eoff		-	0.3	-	mJ
Total switching Energy	Etotal		-	1.09	-	mJ
Turn-On delay time	td(on)	VCE=400V,Ic=20A, RG=10Ω,VGE=15V TC=175°C Inductive Load	-	14	-	ns
Turn-On rise time	tr		-	54	-	ns
Turn-off delay time	td(off)		-	76	-	ns
Turn-off Fall time	tf		-	146	-	ns
Turn-on energy	Eon		-	0.8	-	mJ
Turn-off energy	Eoff		-	0.49	-	mJ
Total switching Energy	Etotal		-	1.3	-	mJ

Total Gate Charge	Qg	VCE=400V, Ic=20A RG=10Ω, VGE=15V TC=25°C (note3,4)	-	43.9	-	nC
Gate to emitter charge	Qge		-	10.0	-	
Gate to collector charge	Qgc		-	18.9	-	
Gate resistance	Rg	f=1MHz, open collector	-	1.8	-	Ω
Anti-Paraller Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	VF	VGE=0V, IF=20A. TC=25°C	-	1.4	-	V
		TC=125°C	-	1.2	-	V
		TC=175°C	-	1.0	-	V
Diode Reverse recovery time	t _{rr}	VGE=0V, IF=20A di=dt=100A/us (note 4) TC=25°C	-	254	-	ns
Reverse recovery charge	Q _{rr}		-	347	-	nC
Diode Reverse recovery Current	I _{rrm}		-	2.7	-	A
Diode Reverse recovery time	t _{rr}	VGE=0V, IF=20A di=dt=100A/us (note 4) TC=175°C	-	429	-	ns
Reverse recovery charge	Q _{rr}		-	1010	-	nC
Diode Reverse recovery Current	I _{rrm}		-	4	-	A

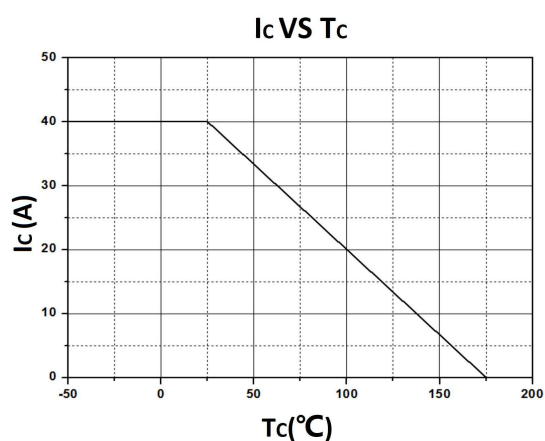
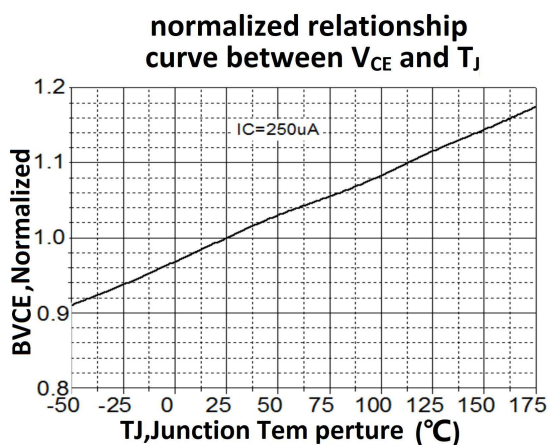
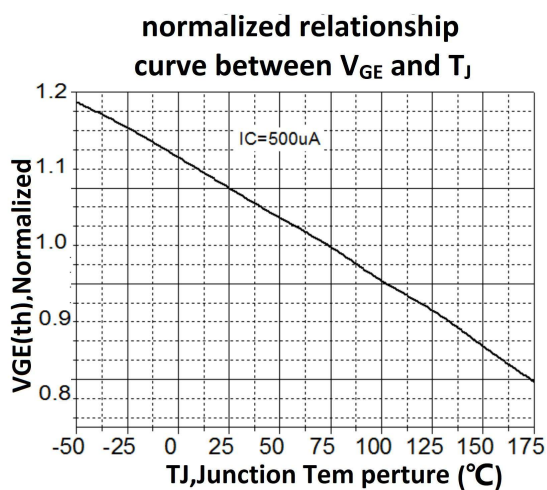
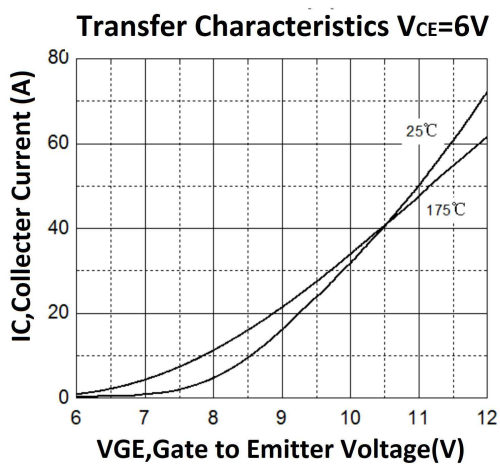
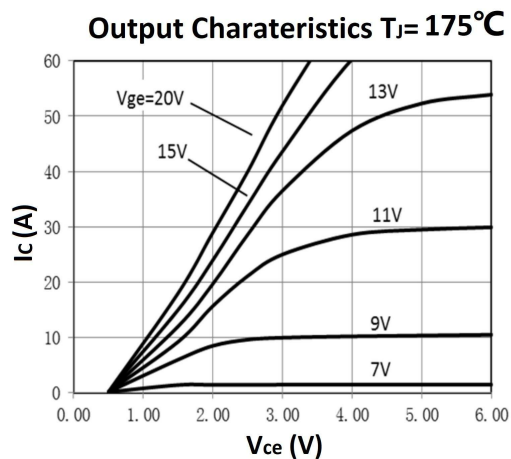
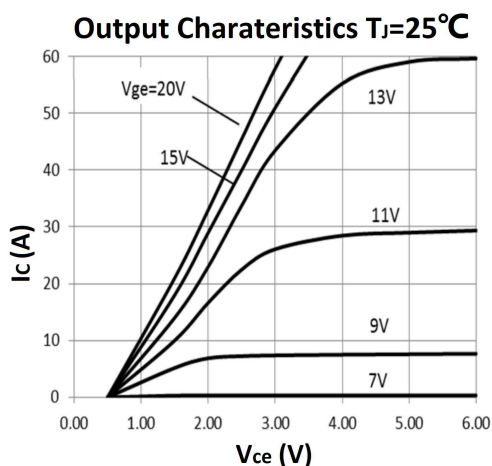
Thermal Characteristics

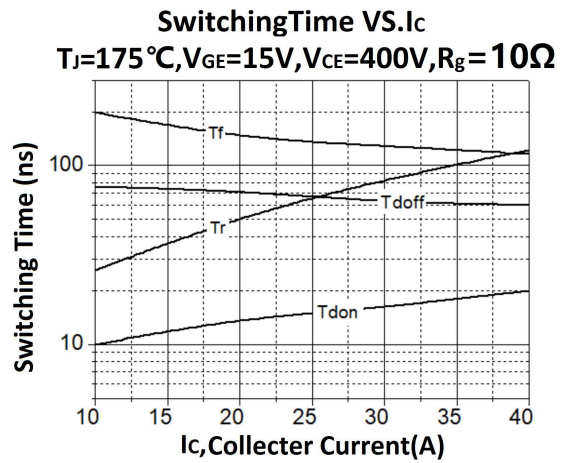
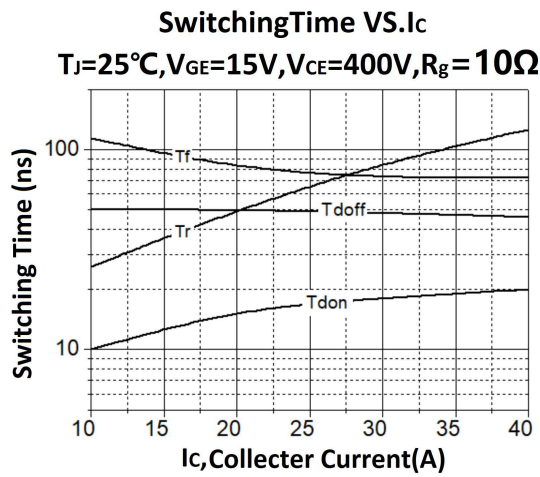
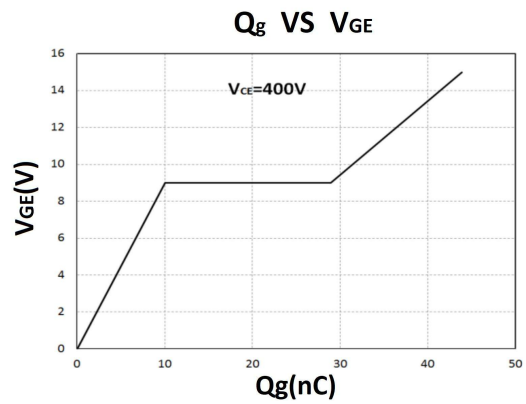
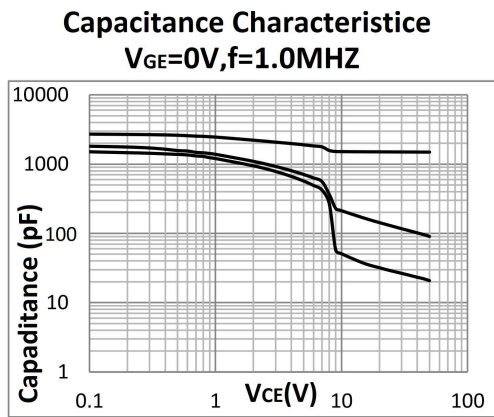
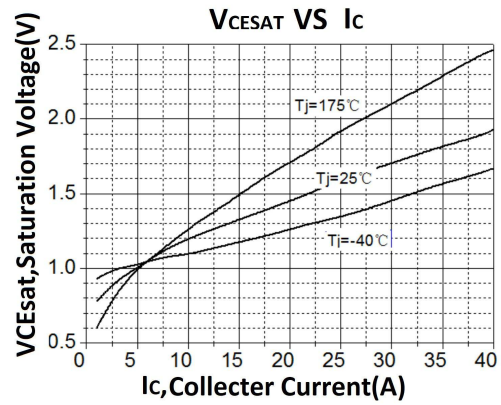
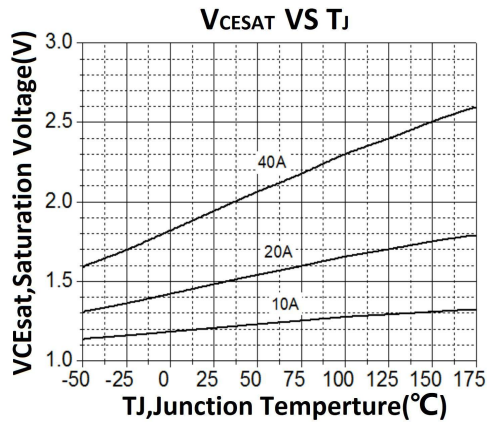
Parameter	Symbol	SL20T65F	SL20T65 / SL20T65FZ	SL20T65FL	Unit
IGBT Thermal Resistance, Junction to Case	R _{th(j-c)}	3.57	0.77	0.77	°C/W
FRD Thermal Resistance, Junction to Case	R _{th(j-c)}	7.7	2.05	2.05	°C/W
Thermal Resistance, Junction to Ambient	R _{th(j-A)}	62.5	62.5	33.8	°C/W

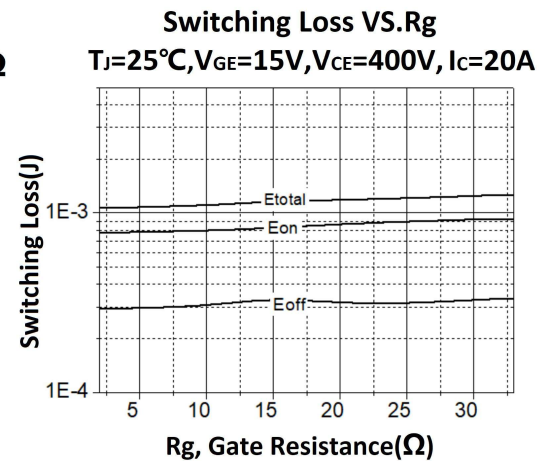
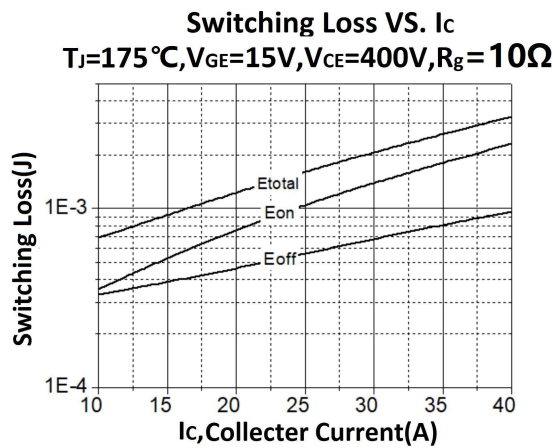
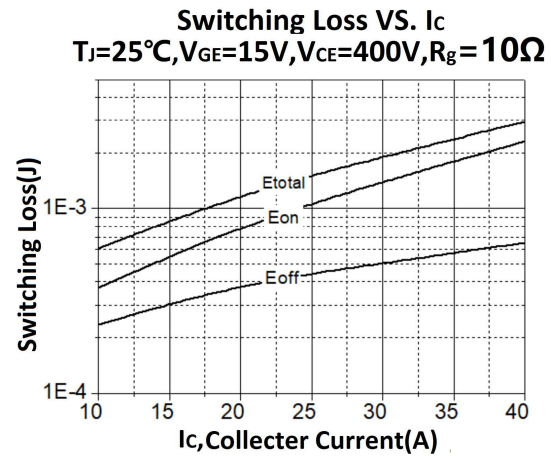
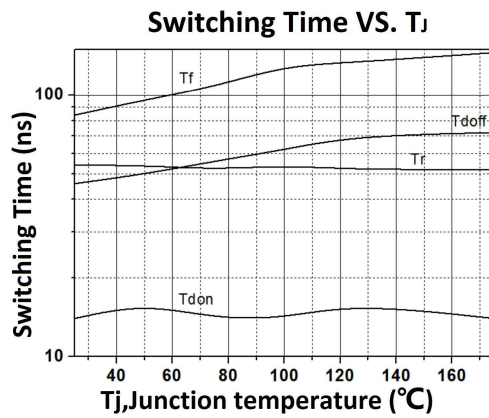
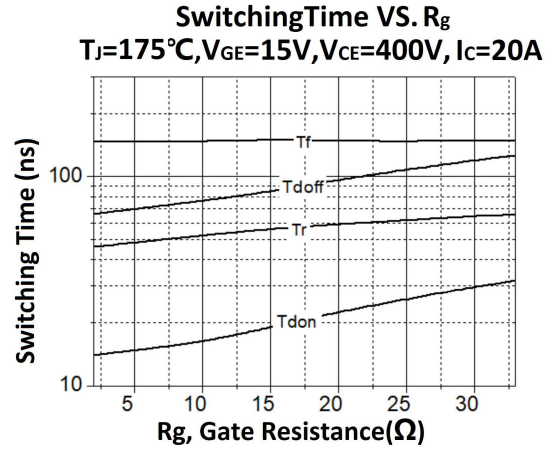
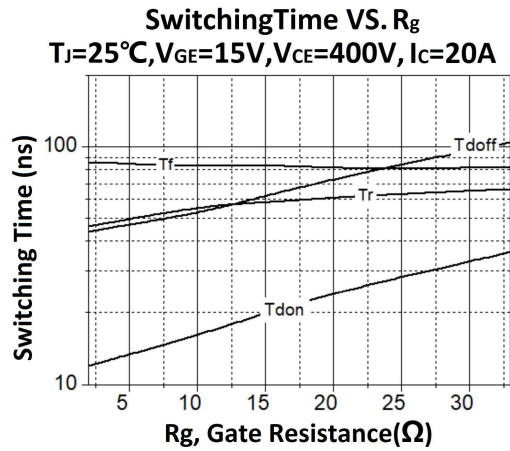
Order Message

Order codes	Package	Packaging
SL20T65F	TO-220F	Tube
SL20T65	TO-220	Tube
SL20T65FZ	TO-263	Tube
SL20T65FL	TO-247	Tube

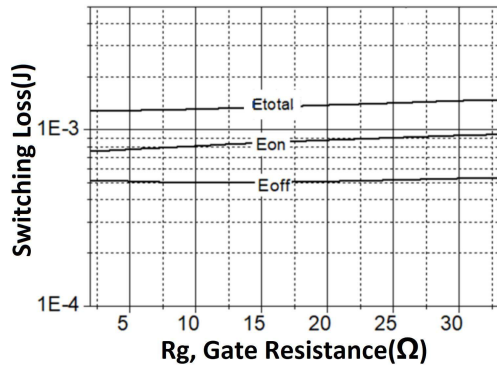
Electrical Characteristics(curves)



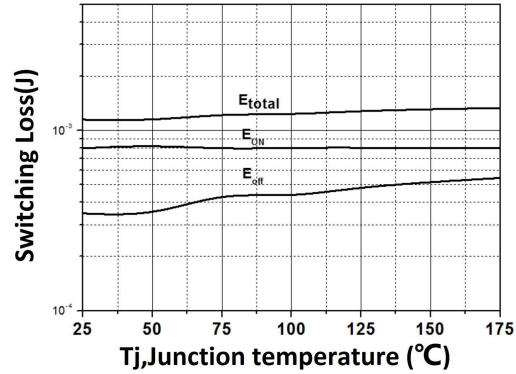




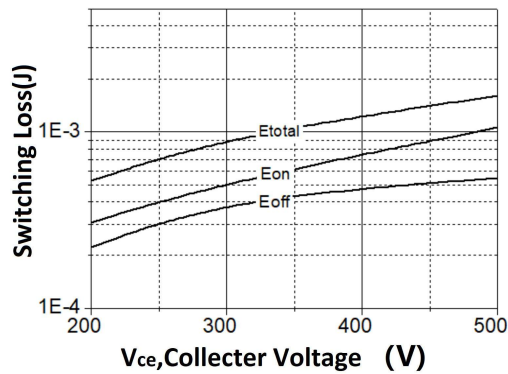
Switching Loss VS. R_g
 $T_J=175^\circ\text{C}, V_{GE}=15\text{V}, V_{CE}=400\text{V}, I_C=20\text{A}$



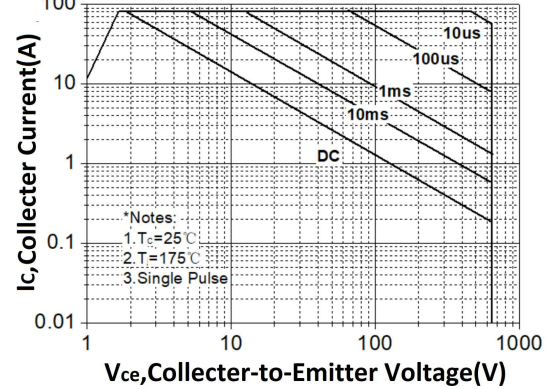
Switching Loss VS. T_J
 $V_{GE}=15\text{V}, V_{CE}=400\text{V}, I_C=20\text{A}, R_g=10\Omega$



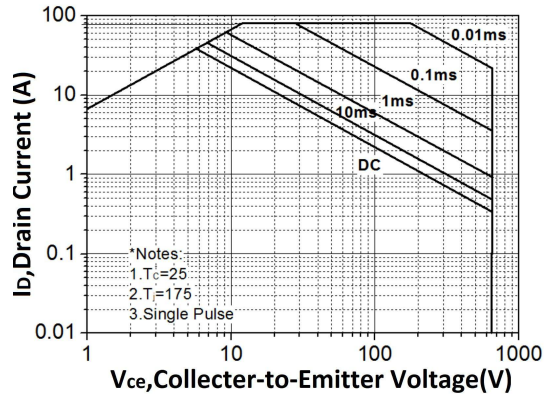
Switching Loss VS. $V_{CE(V)}$
 $T_J=175^\circ\text{C}, V_{GE}=15\text{V}, I_C=20\text{A}, R_g=10\Omega$



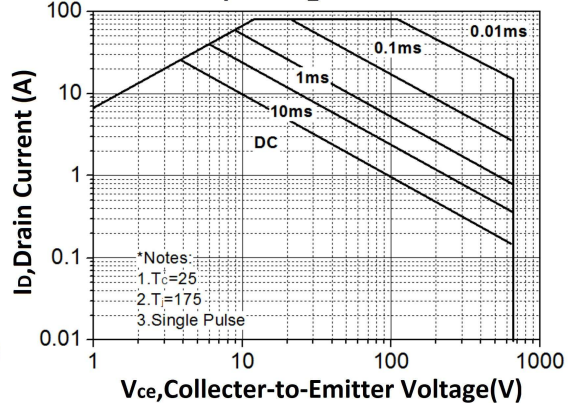
Safe Operating Area TO-247



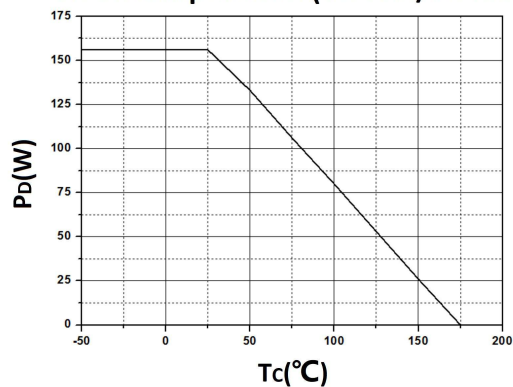
Safe Operating Area TO-220 /TO-263



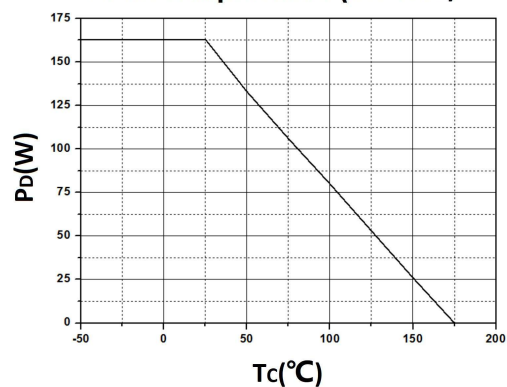
Safe Operating Area TO-220F



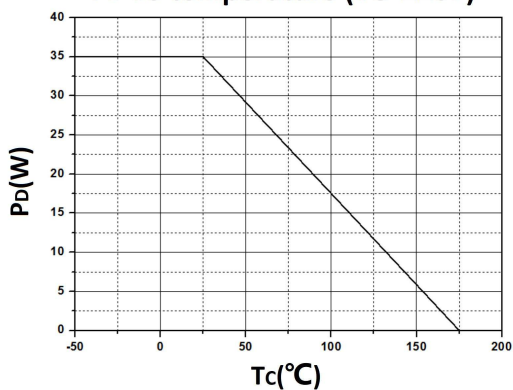
P_D VS temperature (TO-220/TO-263)



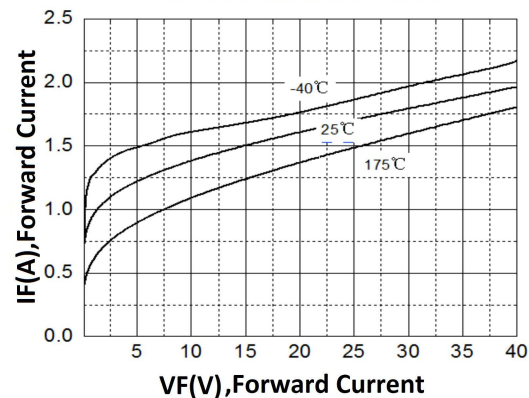
P_D VS temperature (TO-247)



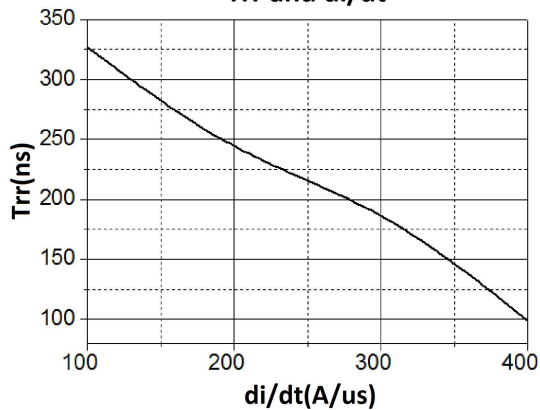
P_D VS temperature (TO-220F)



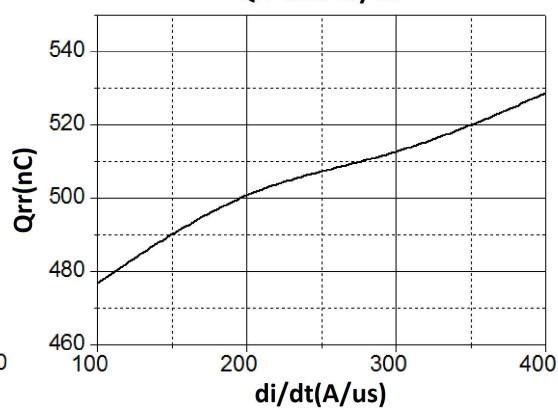
Diode Characteristic

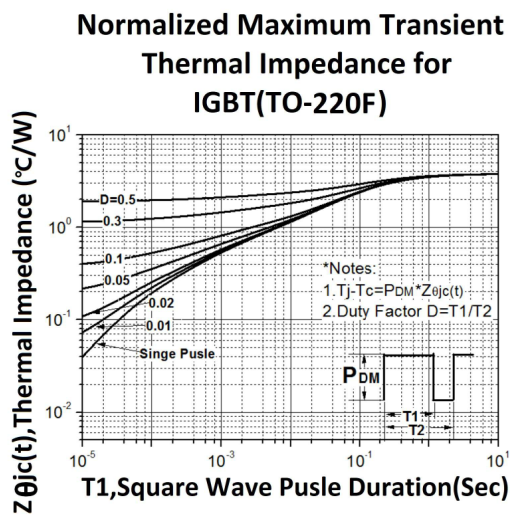
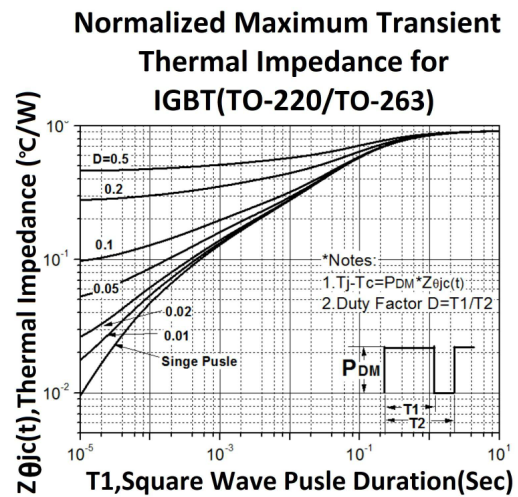
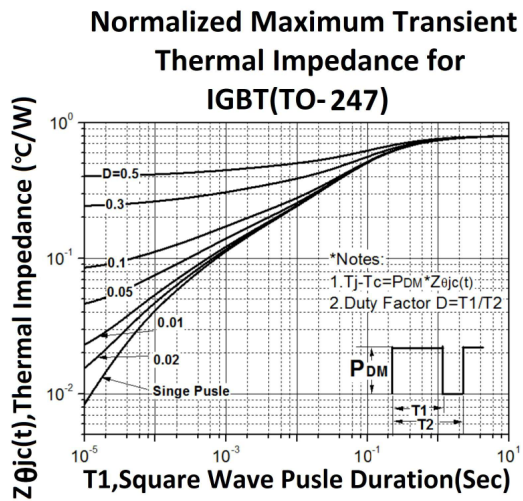
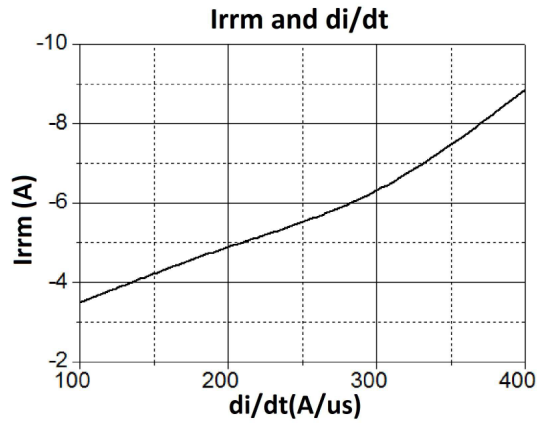
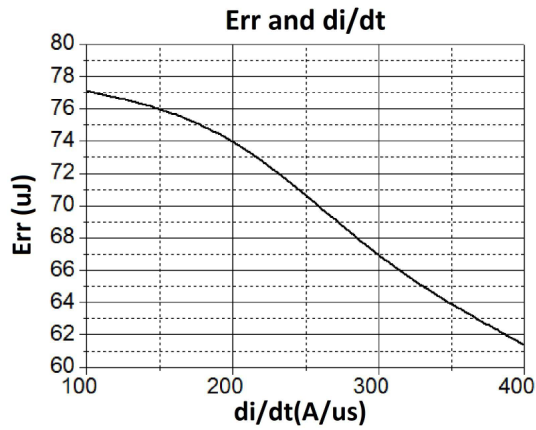


T_{rr} and di/dt

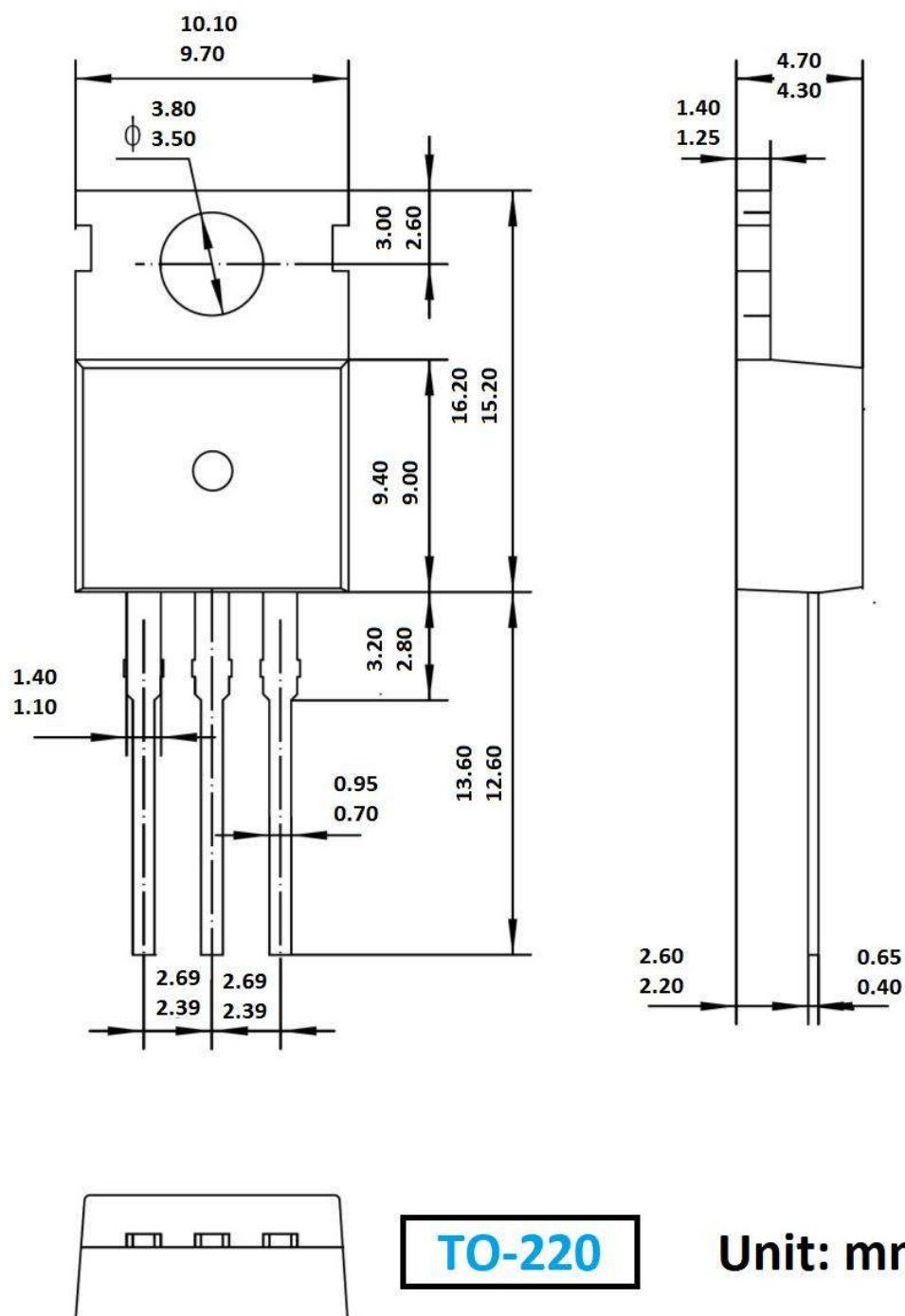


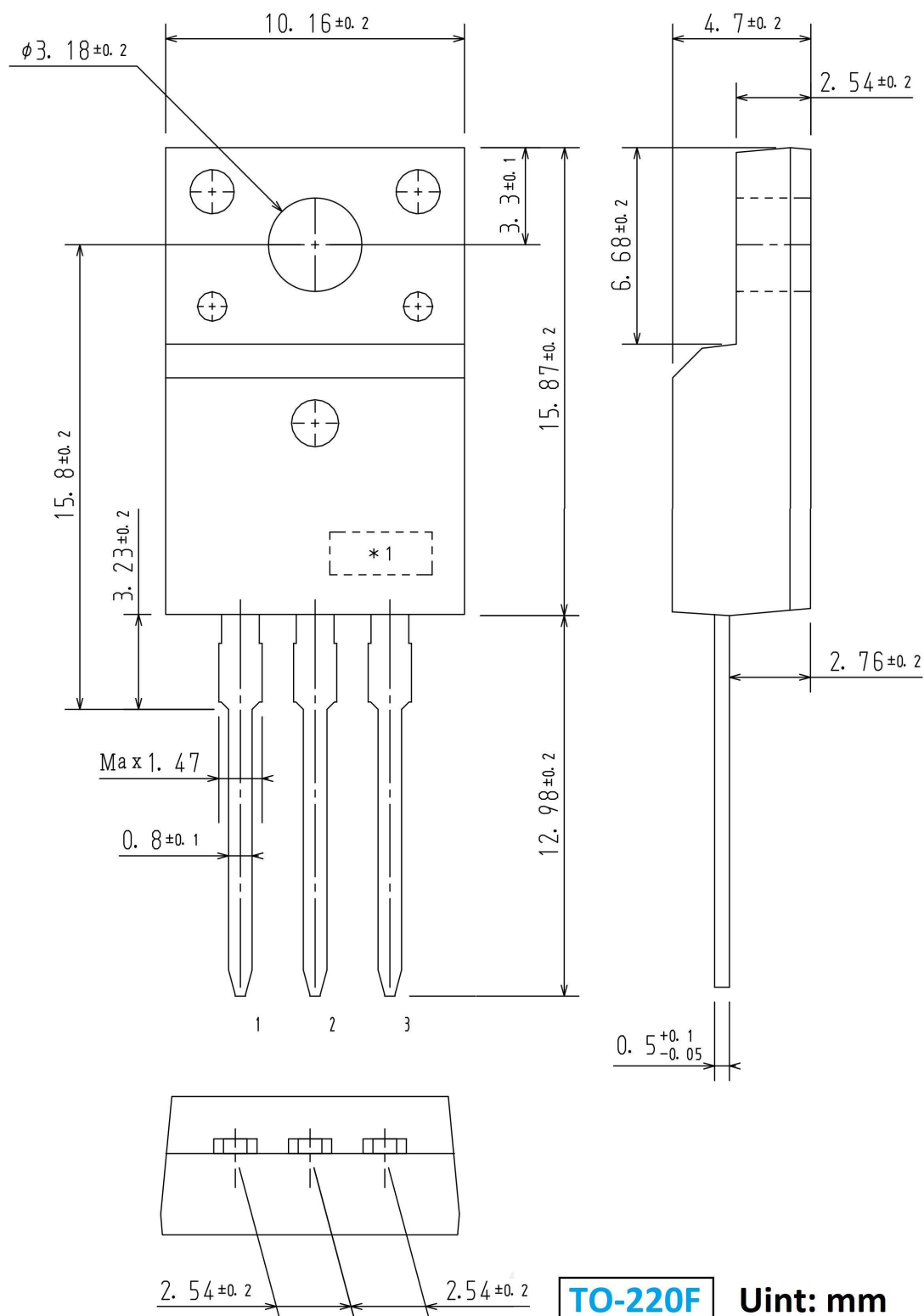
Q_{rr} and di/dt





Package Mechanical DATA





TO-220F

Unit: mm

