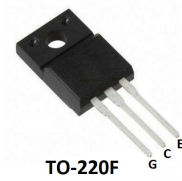
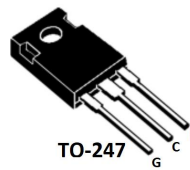


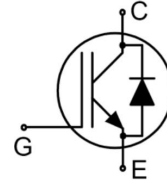
Features

- Low gate charge
- Trench FS Technology
- RoHS product



Applications

- General purpose inverters
- Induction heating(IH)
- UPS



Absolute Ratings ($T_C=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	1200	V
*Collector Current-continuous	I_C	$T=25^{\circ}\text{C}$	30
		$T=100^{\circ}\text{C}$	15
Collector Current-pulse(note 1)	I_{CM}	45	A
Diode Continuous forward current	I_F	$T=25^{\circ}\text{C}$	30
		$T=100^{\circ}\text{C}$	15
Diode Maximum Forward Current (Note 1)	I_{FM}	45	A
Gate-Emitter Voltage	V_{GES}	± 20	V
Power Dissipation(TO-247)	P_D	$T_C=25^{\circ}\text{C}$	238
		$T_C=100^{\circ}\text{C}$	119
Power Dissipation(TO-220F)	P_D	$T_C=25^{\circ}\text{C}$	58
		$T_C=100^{\circ}\text{C}$	29
Operating Temperature Range	T_J	-40~+175	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55~+150	$^{\circ}\text{C}$
Maximum Lead Temperature for Soldering Purposes	T_L	300	$^{\circ}\text{C}$

*Collector current limited by maximum Junction temperature

Electrical Characteristic ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
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Off-Characteristics							
Collector-Emitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	1200	-	-	V	
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_C=25^\circ C$	-	-	100	μA	
		$T_C=100^\circ C$	-	-	2	mA	
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	± 150	nA	
On-Characteristics							
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	4.5	-	6.5	V	
Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=15A$	$T_C=25^\circ C$	-	1.6	2.1	V
			$T_C=125^\circ C$	-	1.9	-	V
			$T_C=150^\circ C$	-	2.1	-	V
Dynamic Characteristics							
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	1260	-	pF	
Output capacitance	C_{oes}		-	78	-	pF	
Reverse transfer capacitance	C_{res}		-	41	-	pF	
Total Gate Charge	Q_g	$V_{CC}=960V, I_C=15A, V_{GE}=15V^{3,4}$	-	112	-	nC	
Gate to emitter charge	Q_{ge}		-	8.8	-		
Gate to collector charge	Q_{gc}		-	80.7	-		
Switching Characteristics							
Turn-On delay time	$t_{d(on)}$	$V_{CE}=600V, I_C=15A, R_G=10\Omega, \text{Inductive load } T_C=25^\circ C$	-	10	-	ns	
Turn-On rise time	t_r		-	34	-	ns	
Turn-off delay time	$t_{d(off)}$		-	52	-	ns	
Turn-off Fall time	t_f		-	174	-	ns	
Turn-on energy	E_{on}		-	0.38	-	mJ	
Turn-off energy	E_{off}		-	0.67	-	mJ	
Total switching Energy	E_{tot}		-	1.05	-	mJ	
Anti-Parallel Diode Characteristics and Maximum Ratings							
Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=15A.$	-	1.85	2.2	V	
Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=600V, I_F=15A$ $dl_F/dt=450A/\mu s^4$	-	283	-	ns	
Reverse recovery charge	Q_{rr}		-	1180	-	nC	

Thermal Characteristics

Symbol	Parameter	Type		Units
		TO-247	TO-220F	
$R_{th\ j-c, IGBT}$	Thermal Resistance, Junction to case for IGBT	0.63	2.6	$^{\circ}C/W$
$R_{th\ j-c, FRD}$	Thermal Resistance, Junction to case for FRD	0.82	3.2	$^{\circ}C/W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	40	50	$^{\circ}C/W$

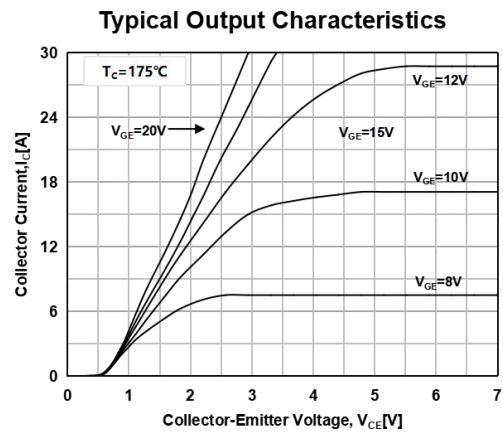
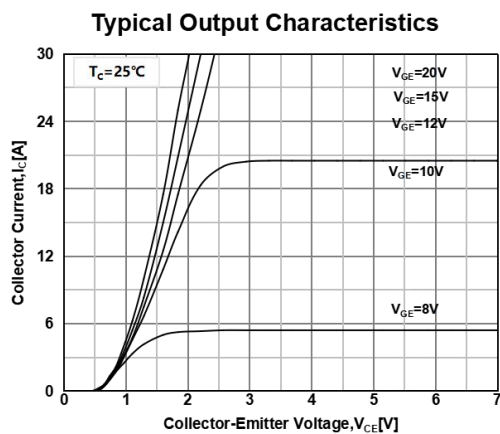
Notes:

- 1: Pulse width limited by maximum junction temperature
- 2: Allowed number of short circuits: <1000; time between short circuits: >1s.
- 3: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- 4: Essentially independent of operating temperature

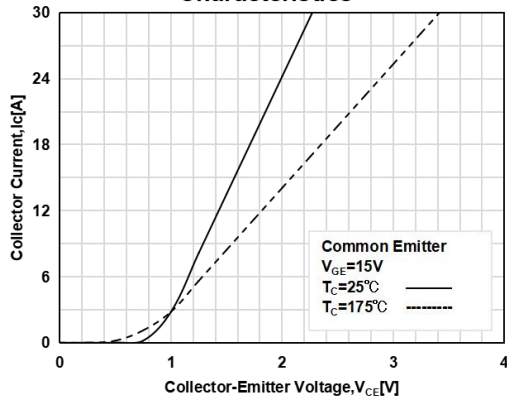
Order Message

Order codes	Package	Packaging
MSG15T120HLC0	TO-247	Tube
MSG15T120HLT1	TO-220F	tube

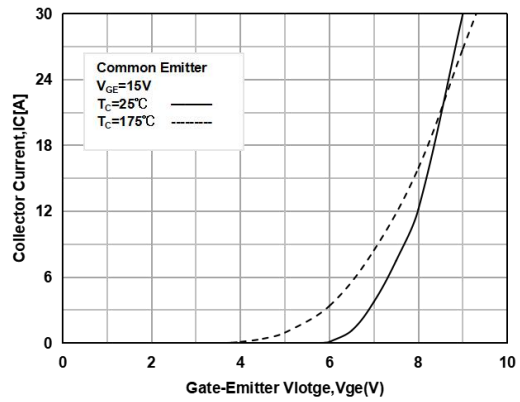
Electrical Characteristics (curves)



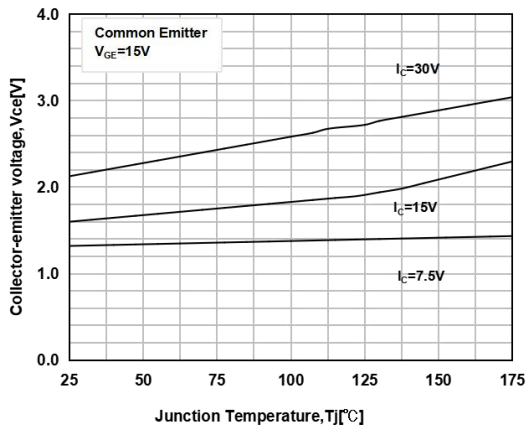
Typical Saturation Voltage Characteristics



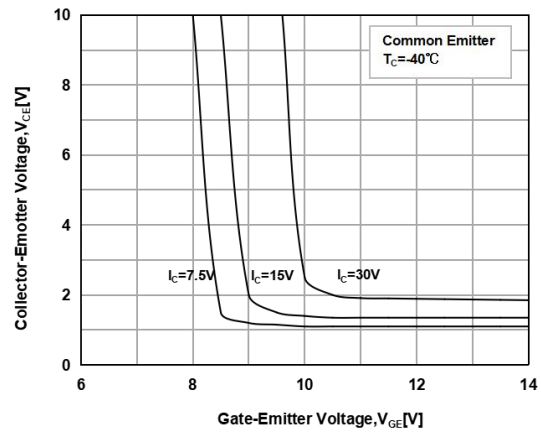
Transfer Characteristics



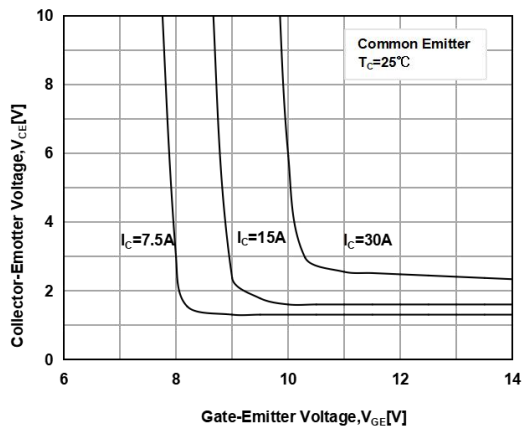
Saturation Voltage vs. Junction temperature at Variant Current Level



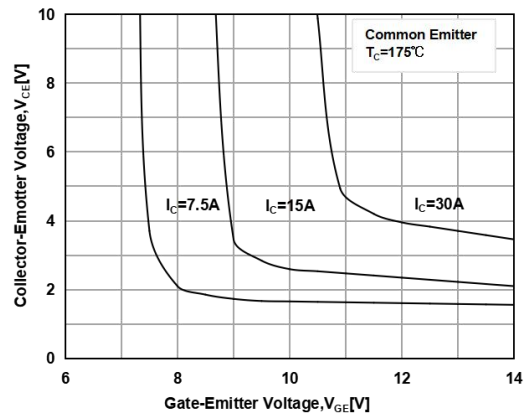
Saturation Voltage vs. V_{GE}



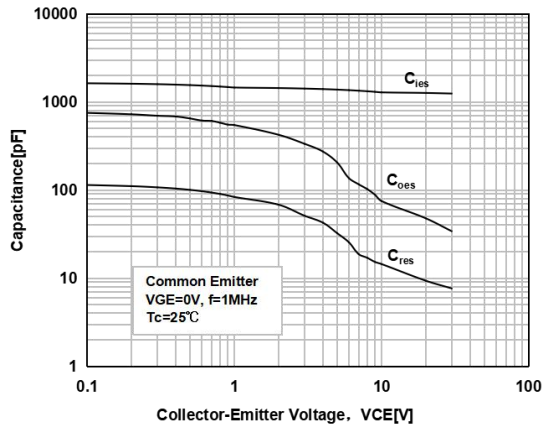
Saturation Voltage vs. V_{GE}



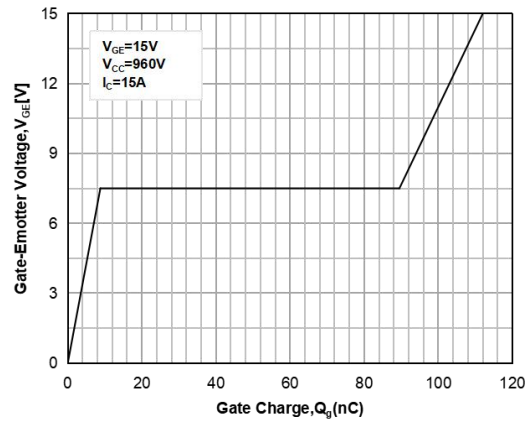
Saturation Voltage vs. V_{GE}



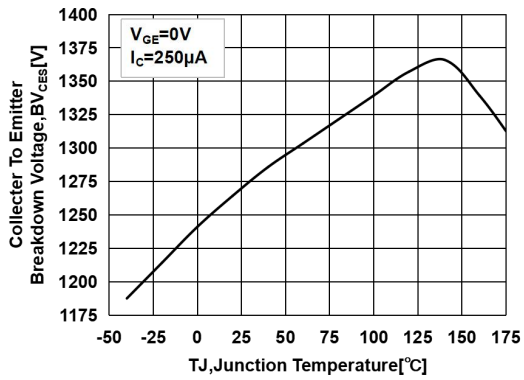
Capacitance Characteristics



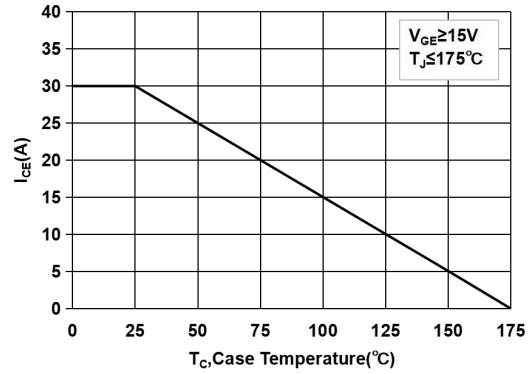
Gate Charge Characteristics



Collector to Emitter Breakdown Voltage vs. Junction Temperature

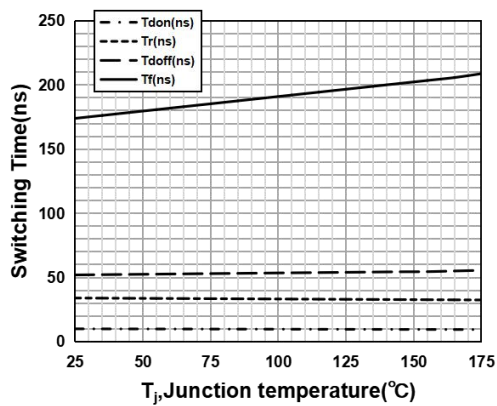


Maximum Collector-Emitter Current Standard Derating Curve



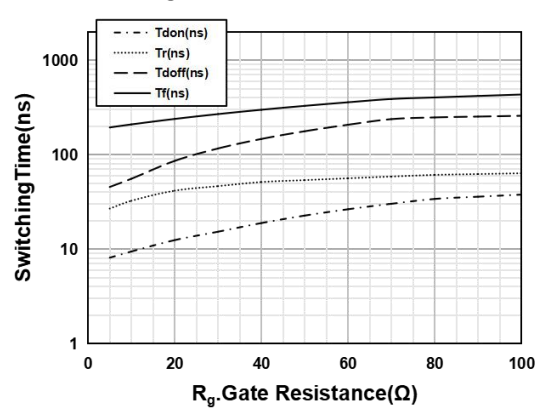
Switching Time vs. Tj

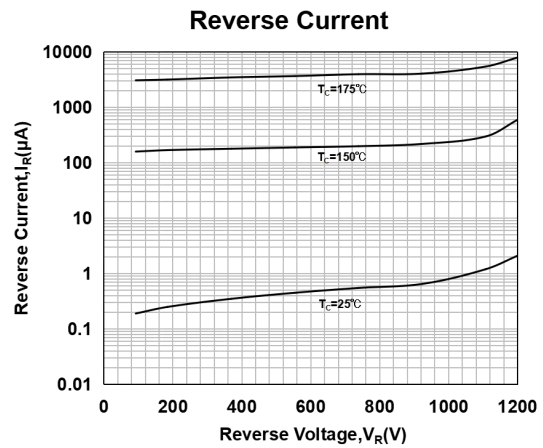
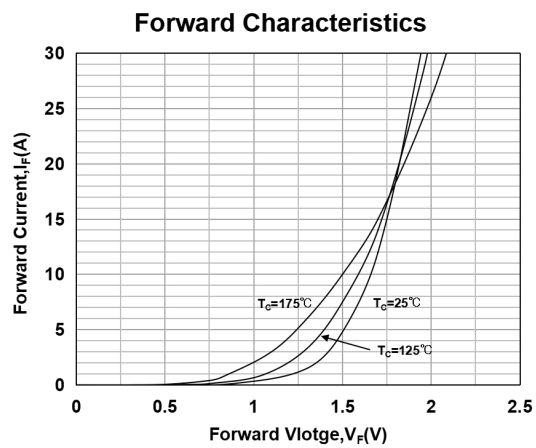
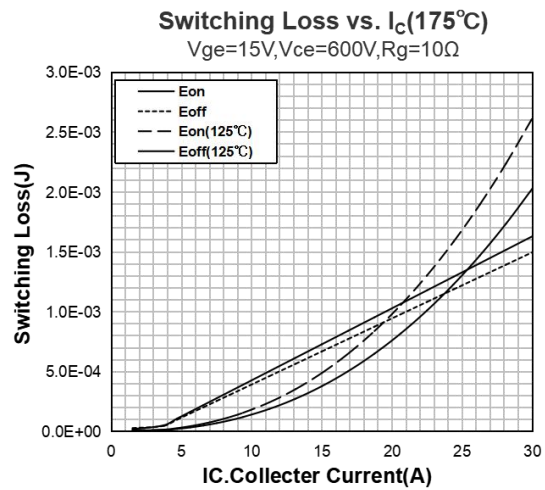
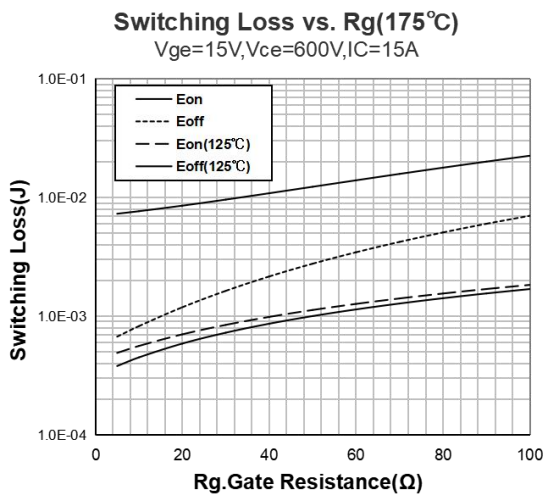
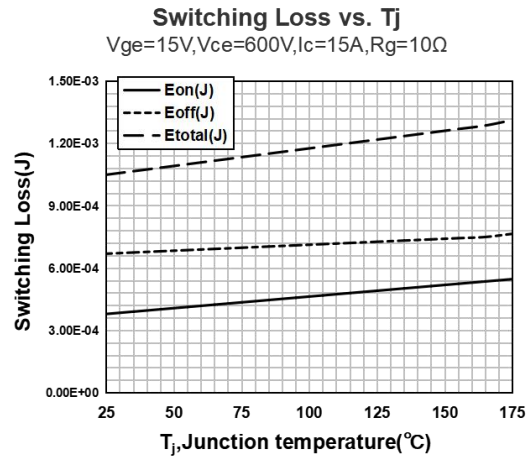
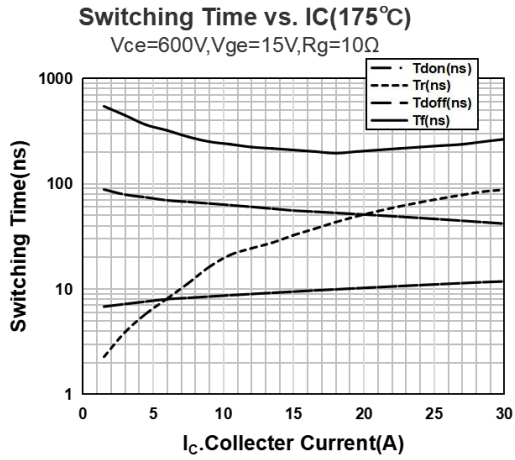
V_{ge}=15V, V_{CE}=600V, I_C=15A, R_g=10Ω



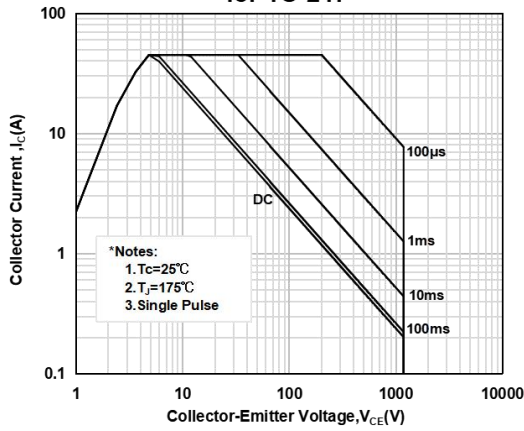
Switching Time Vs. Rg(175°C)

V_{ge}=15V, V_{CE}=600V, I_C=15A

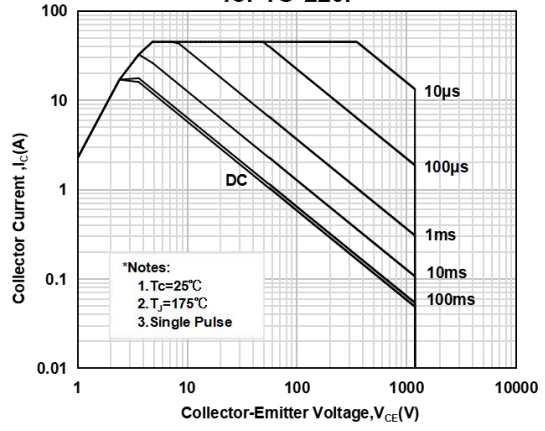




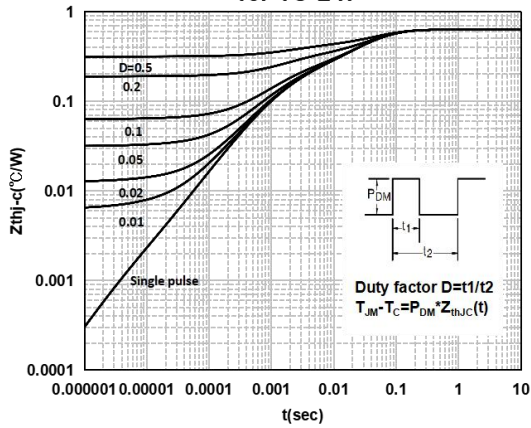
Foward Bias Safe Operating Area for TO-247



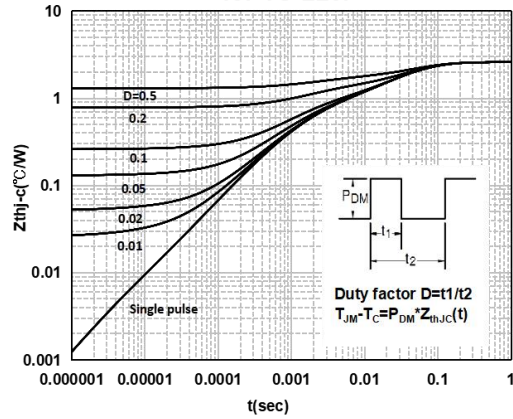
Foward Bias Safe Operating Area for TO-220F



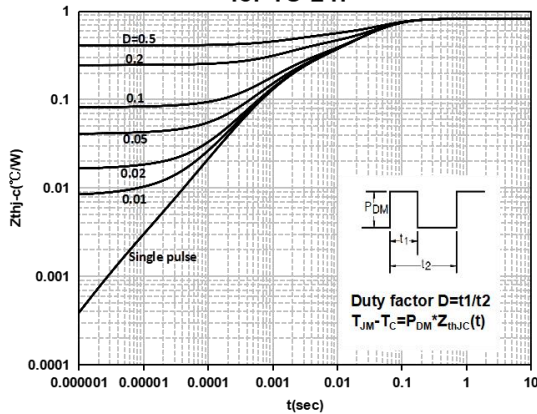
IGBT Transient Thermal Impedance for TO-247



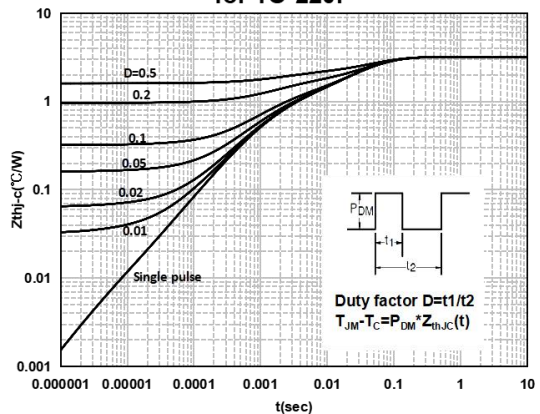
IGBT Transient Thermal Impedance for TO-220F



FRD Transient Thermal Impedance for TO-247



FRD Transient Thermal Impedance for TO-220F



Package Mechanical DATA

