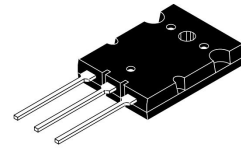
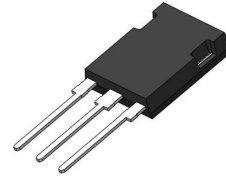


Features

- High efficiency in hard switching
And resonant topologies
- 10μsec short circuit withstand
Time at $T_{vj}=175^{\circ}\text{C}$
- Low Gate Charge QG
- Very soft, fast recovery full
Current anti-parallel diode
- Maximum junction temperature
 $T_{vjmax}=175^{\circ}\text{C}$



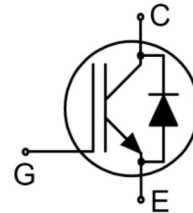
TO-264



TO-247plus

Applications

- UPS
- Charger
- Energy Storage
- Three-level Solar String Inverter



Absolute Ratings($T_c=25^{\circ}\text{C}$)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{ce}	1200	V
Collector Current-continuous	I_c $T=25^{\circ}\text{C}$ $T=100^{\circ}\text{C}$	200	A
		100	A
Diode forward current	$I_{FT}=25^{\circ}\text{C}$ $T_c=100^{\circ}\text{C}$	200	A
		100	A
Collector Current-pulse (note 1)	I_{CM}	300	A
Gate-Emitter Voltage	V_{GES}	± 20	V
Power Dissipation (TO-264)	PD	625	W
Power Dissipation (TO-247Plus)		882	W
Operating and Storage Temperature Range	T_J, T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$
Diode Maximum Forward Current (Note 1)	I_{FM}	300	A
Short Circuit Withstand Time	t_{sc}	10	us
Maximum Lead Temperature for Soldering Purposes	T_L	260	$^{\circ}\text{C}$

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_c=0.5mA, V_{GE}=0V$	1200	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_C=25^{\circ}C$	-	-	450	μA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	100	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-100	nA
Trans-conductance	g_{fs}	$V_{CE}=20V, I_c=100A$		26.0		S
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_c=2.6mA$	5.1	5.8	6.5	V
Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_c=100A$				V
		$T_C=25^{\circ}C$		2.00	2.35	V
		$T_C=175^{\circ}C$		2.50		V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHZ$	-	4856	-	pF
Output capacitance	C_{oes}		-	505	-	pF
Reverse transfer capacitance	C_{res}		-	290	-	pF
Internal emitter inductance measured 5mm from case	L_E			13		nH

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=600V, I_C=100A, R_G=6\Omega, V_{GE}=15V, \text{Inductive Load}$ $T_C=25^{\circ}C$	-	34	-	ns
Turn-On rise time	t_r		-	47	-	ns
Turn-Off delay time	$t_{d(off)}$		-	282	-	ns
Turn-Off Fall time	t_f		-	29	-	ns
Turn-on Loss	E_{on}		-	6.40	-	mJ
Turn-off Loss	E_{off}		-	2.80	-	mJ
Total Loss	E_{ts}		-	9.20	-	mJ

Turn-on delay time	td(on)	V _{CC} =600V, I _C =100A, R _G =6Ω, V _{GE} =15V, Inductive Load T _C =175°C	-	33	-	ns
Turn-On rise time	tr		-	48	-	ns
Turn-Off delay time	td(off)		-	388	-	ns
Turn-Off Fall time	t _f		-	66	-	ns
Turn-on switching Loss	E _{on}		-	10.20	-	mJ
Turn-off switching Loss	E _{off}		-	6.00	-	mJ
Total switching Loss	E _{ts}		-	16.20	-	mJ
Gate Charge	Q _g	V _{CC} =960V, I _C =100A V _{GE} =15V	-	370	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _F	I _F =100A(T _J =25°C)	-	1.9	2.3	V
		T _J =175°C		1.85		V
Diode Reverse recovery time	t _{rr}	V _{CE} =600V I _F =100A di _F /dt=600A/us T _J =25°C	-	370	-	ns
Diode Reverse recovery charge	Q _{rr}		-	5.10	-	μC
Diode Reverse recovery Current	I _{RRM}		-	25	-	A
Diode Peak rate of fall of reverse recovery current during t _b	di _{rr} /dt			-170		A/μs
Diode Reverse recovery time	t _{rr}	V _{CE} =600V I _F =100A di _F /dt=600A/us T _J =175°C	-	640	-	ns
Reverse recovery charge	Q _{rr}		-	12.30	-	μC
Diode Reverse recovery Current	I _{RRM}		-	34	-	A
Diode Peak rate of fall of reverse recovery current during t _b	di _{rr} /dt			-100		A/μs

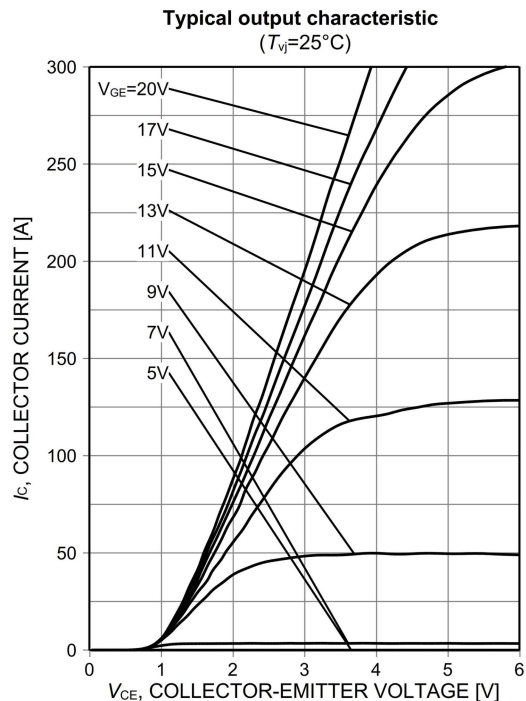
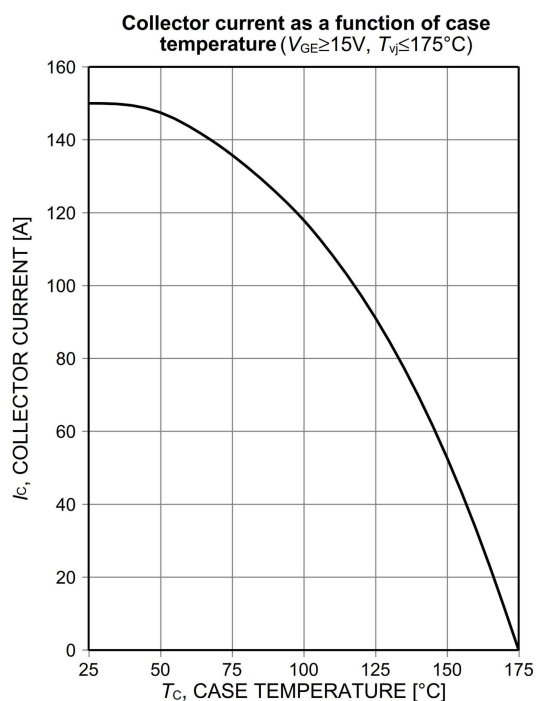
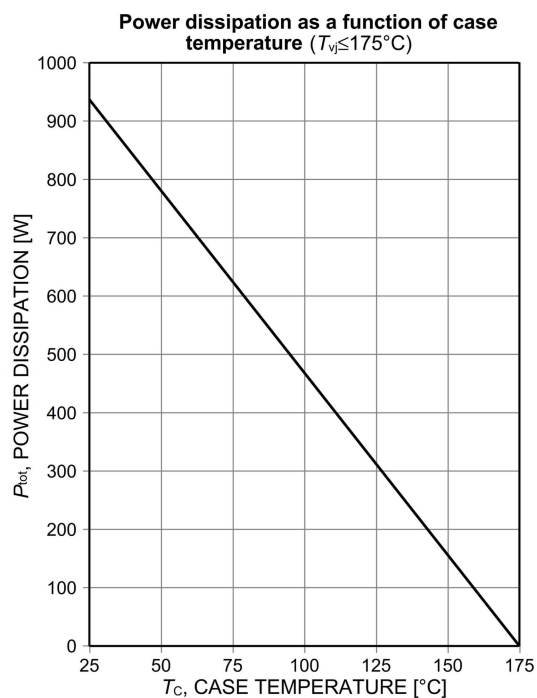
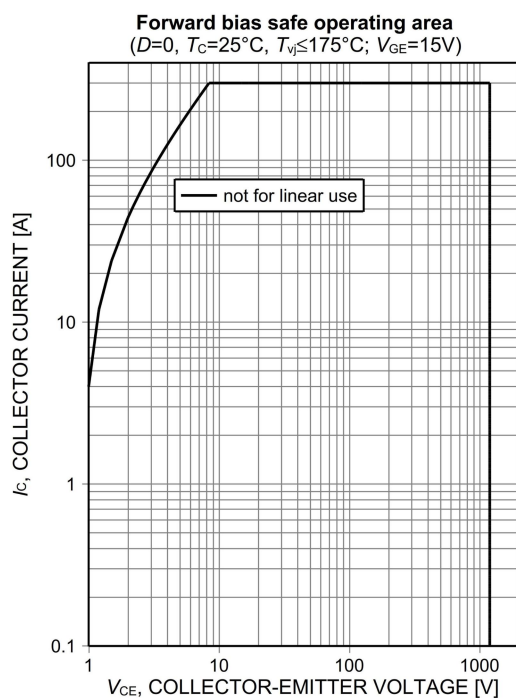
Thermal Characteristic

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction to Case (IGBT)	R _{th(j-c)}	0.2	°C/W
Thermal Resistance, Junction to Case (Diode)	R _{th(j-c)}	0.4	°C/W
Thermal Resistance, Junction to Ambient	R _{th(j-A)}	25	°C/W

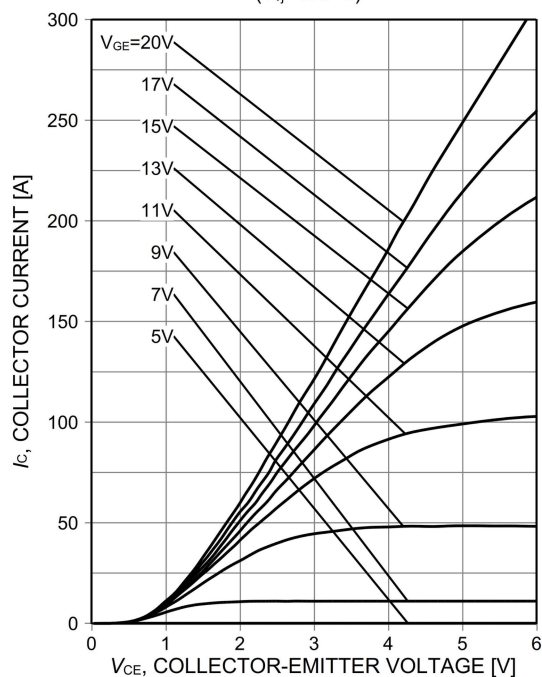
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

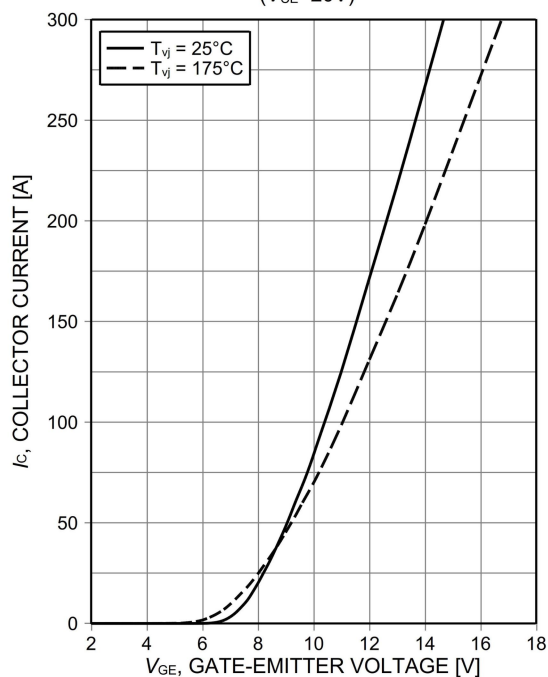
Electrical Characteristics(curves)



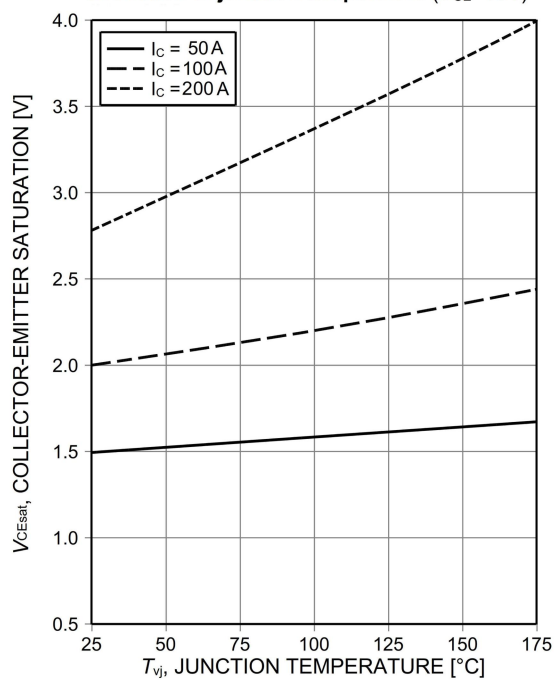
Typical output characteristic
($T_{vj}=175^{\circ}\text{C}$)



Typical transfer characteristic
($V_{CE}=20\text{V}$)

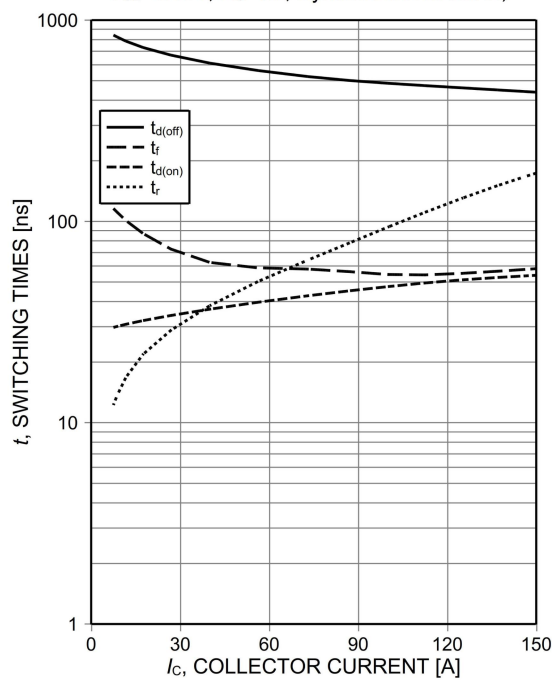


Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)



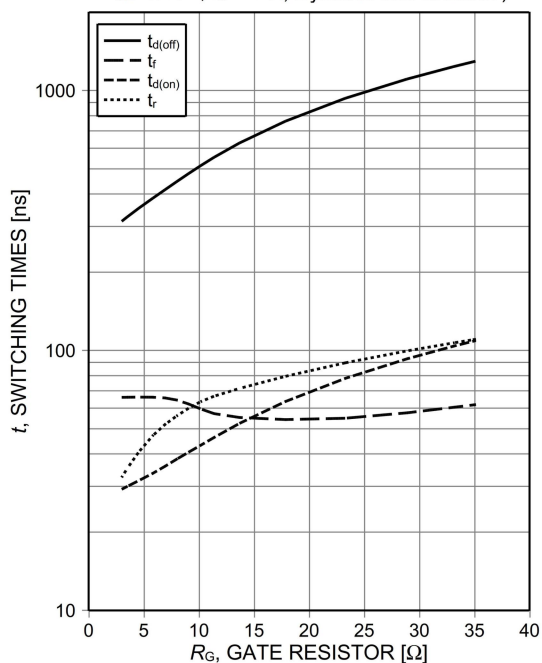
Typical switching times as a function of collector current

(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $R_G=6\Omega$, Dynamic test circuit in)



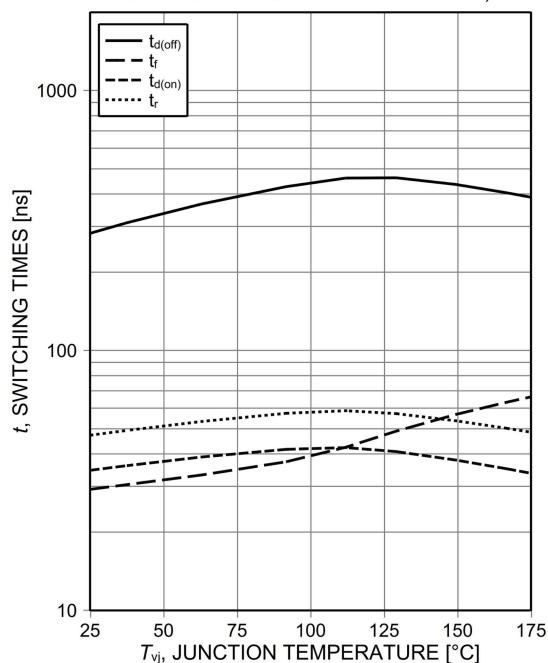
Typical switching times as a function of gate resistor

(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=100\text{A}$, Dynamic test circuit in)

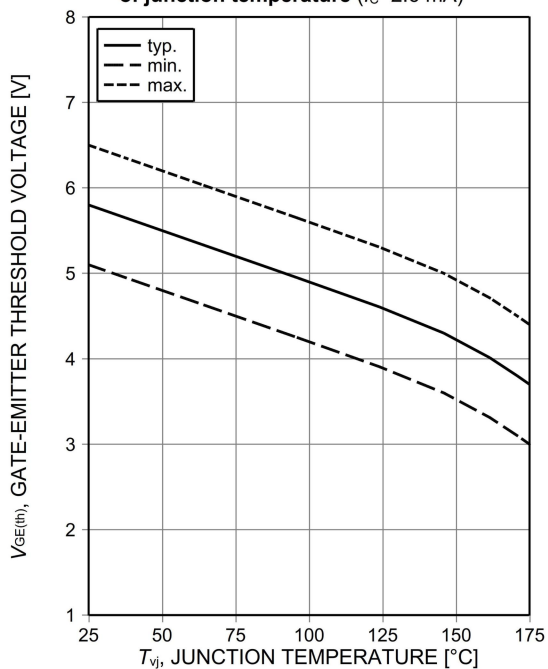


Typical switching times as a function of junction temperature

(inductive load, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=100\text{A}$, $R_G=6\Omega$, Dynamic test circuit in)

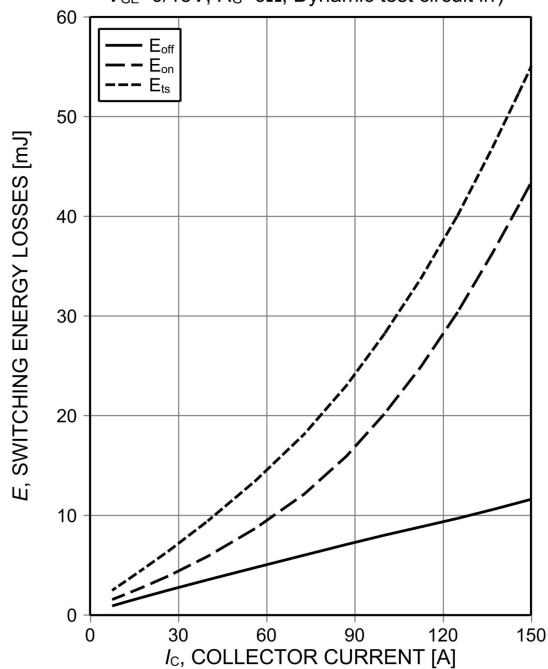


Gate-emitter threshold voltage as a function of junction temperature ($I_C=2.6\text{ mA}$)

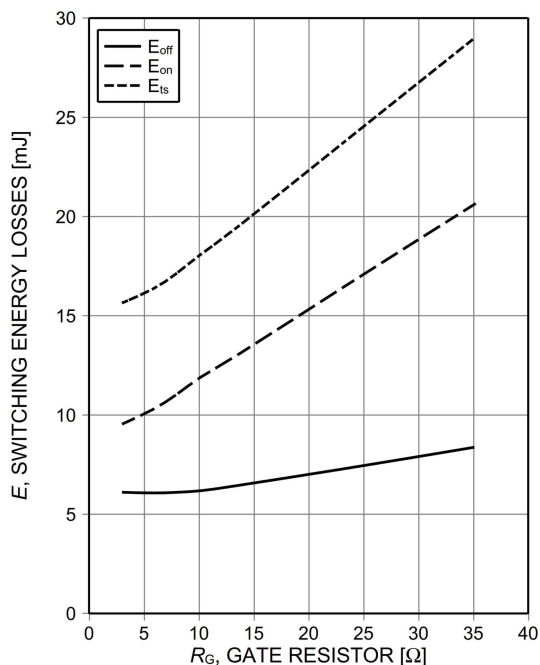


Typical switching energy losses as a function of collector current

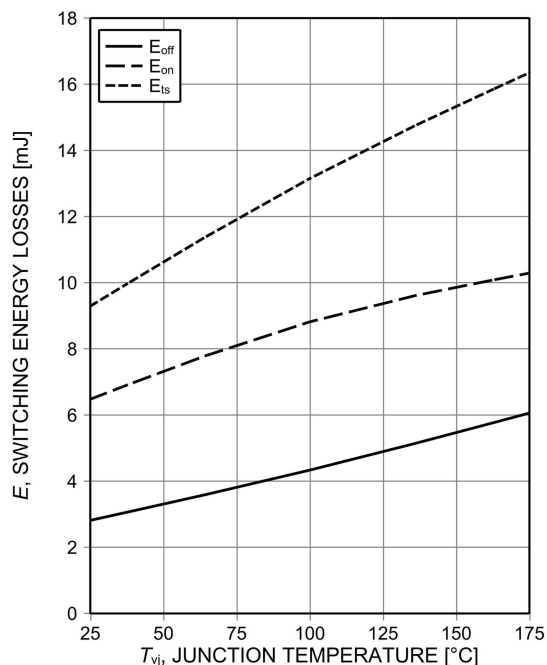
(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $R_G=6\Omega$, Dynamic test circuit in)



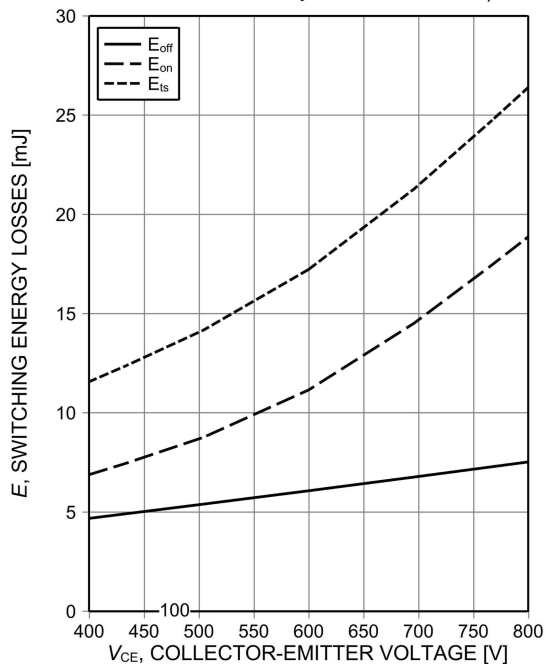
Typical switching energy losses as a function of gate resistor
(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=100\text{A}$, Dynamic test circuit in)



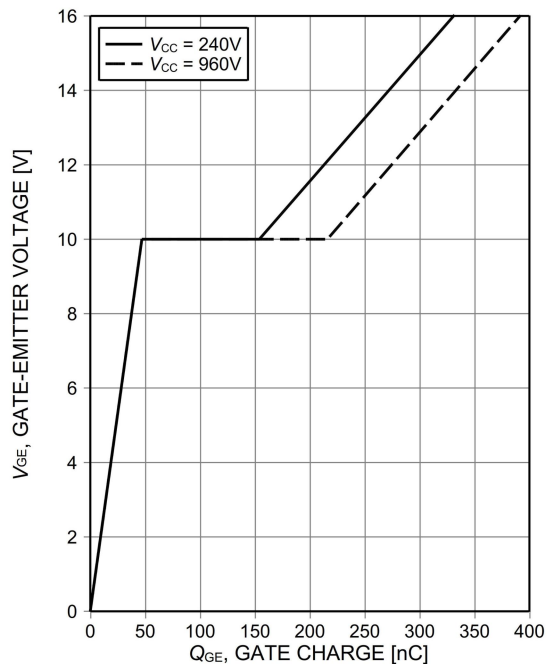
Typical switching energy losses as a function of junction temperature
(inductive load, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=100\text{A}$, $R_G=6\Omega$, Dynamic test circuit in)



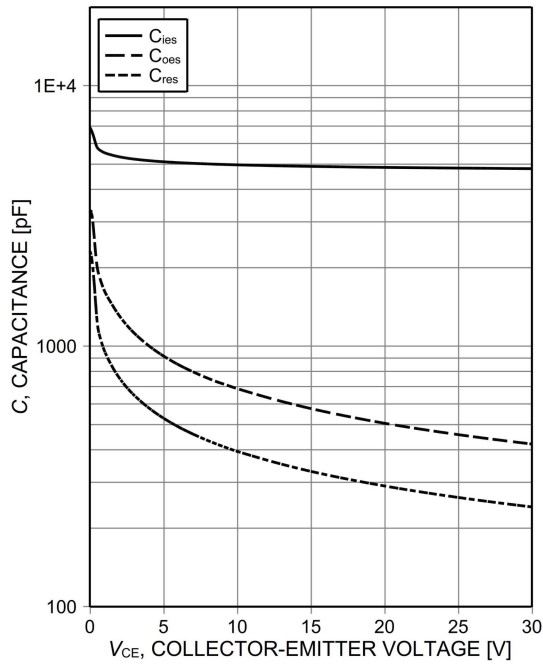
Typical switching energy losses as a function of collector emitter voltage
(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{GE}=0/15\text{V}$, $I_C=100\text{A}$, $R_G=6\Omega$, Dynamic test circuit in)



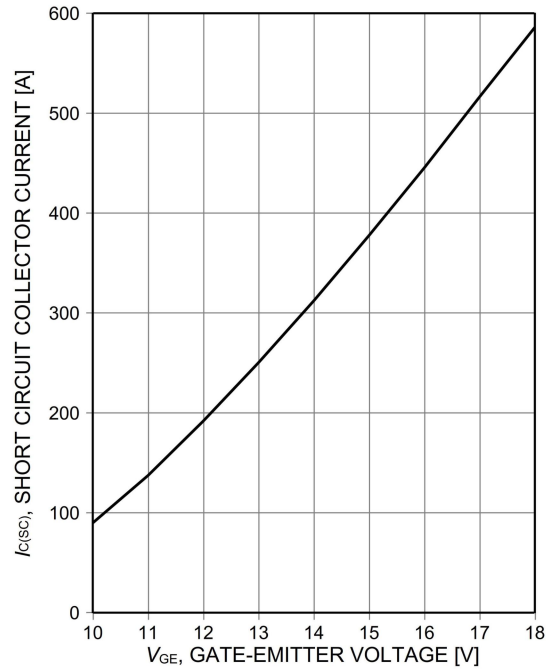
Typical gate charge ($I_C=100\text{A}$)



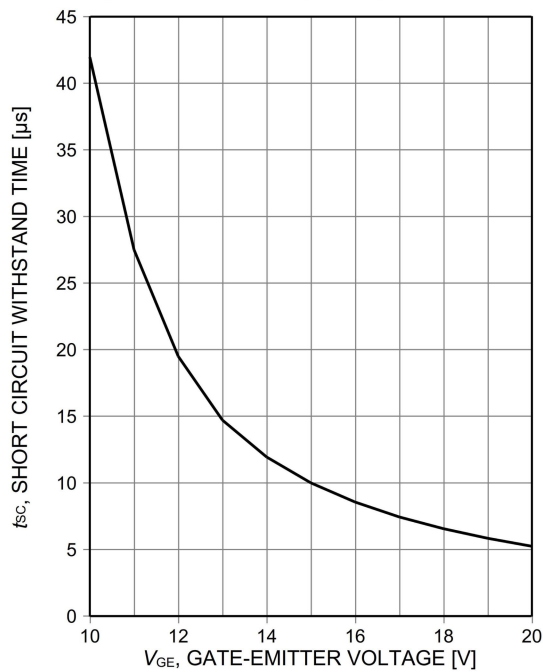
Typical capacitance as a function of collector-emitter voltage
($V_{GE}=0V$, $f=1MHz$)



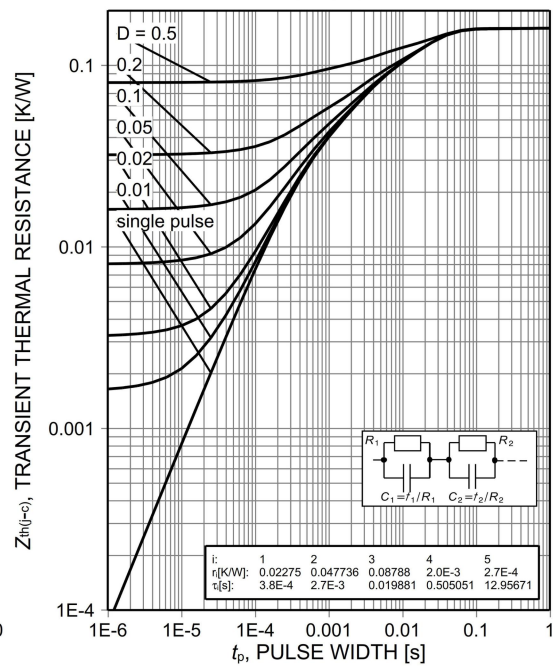
Typical short circuit collector current as a function of gate-emitter voltage
($V_{CE}\leq 600V$, $T_{vj}\leq 175^{\circ}C$)



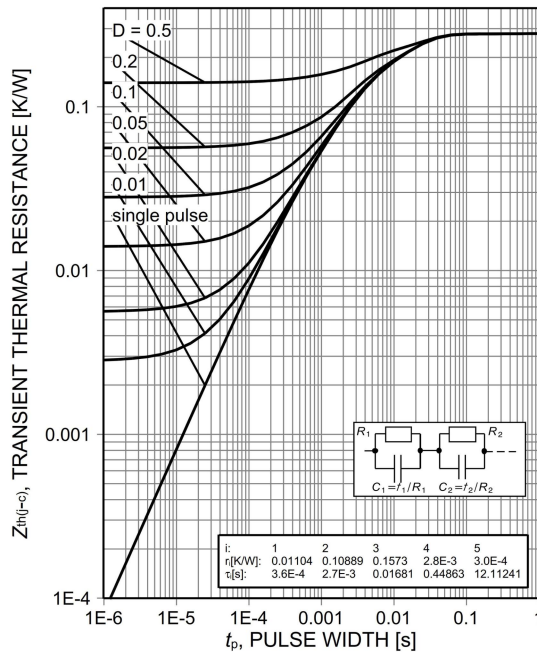
Short circuit withstand time as a function of gate-emitter voltage
($V_{CE}\leq 600V$, start at $T_{vj}\leq 175^{\circ}C$)



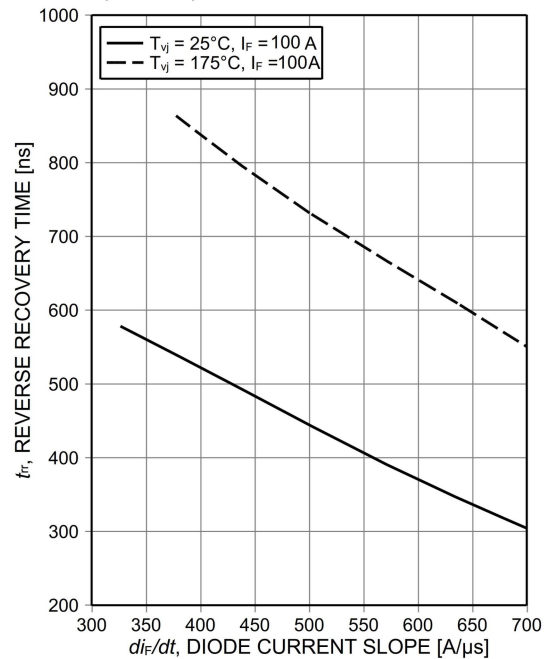
IGBT transient thermal resistance
($D=t_p/T$)



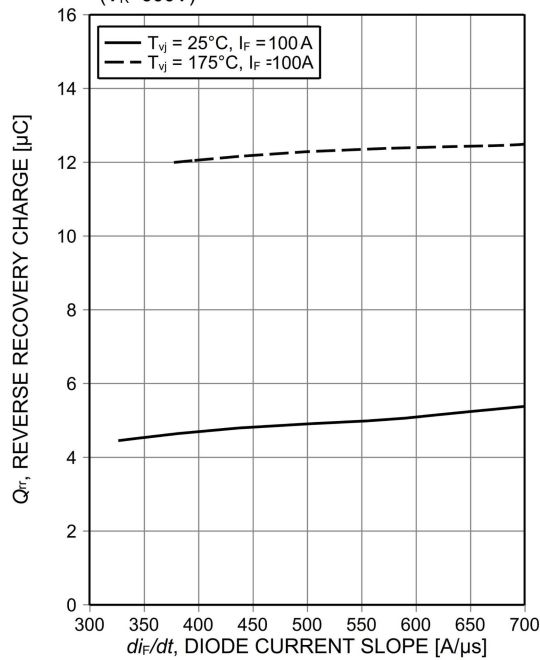
Diode transient thermal impedance as a function of pulse width
($D=t_p/T$)



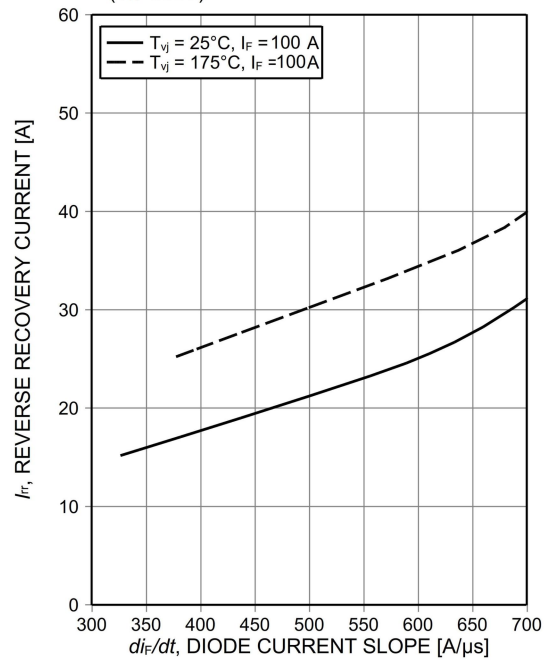
Typical reverse recovery time as a function of diode current slope
($V_R=600V$)



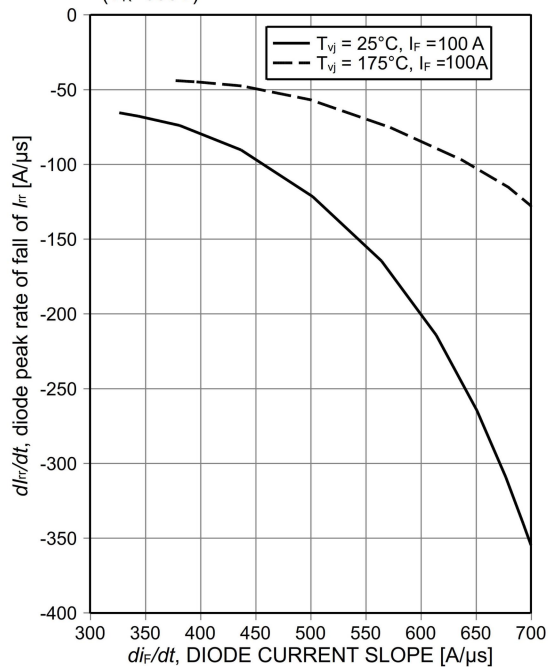
Typical reverse recovery charge as a function of diode current slope
($V_R=600V$)



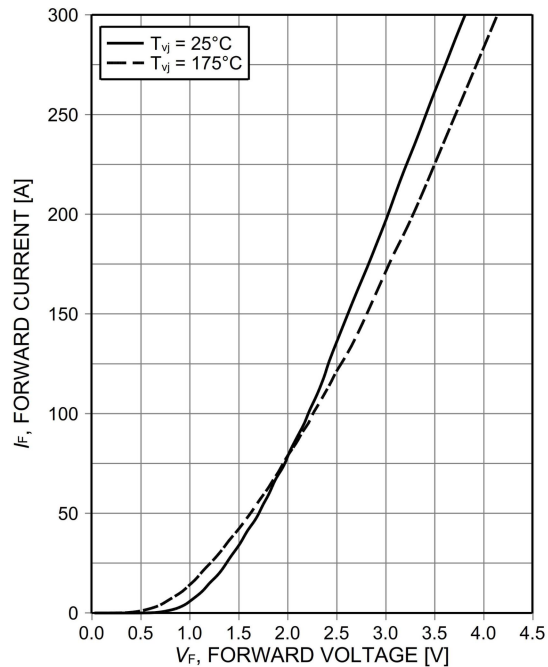
Typical reverse recovery current as a function of diode current slope
($V_R=600V$)



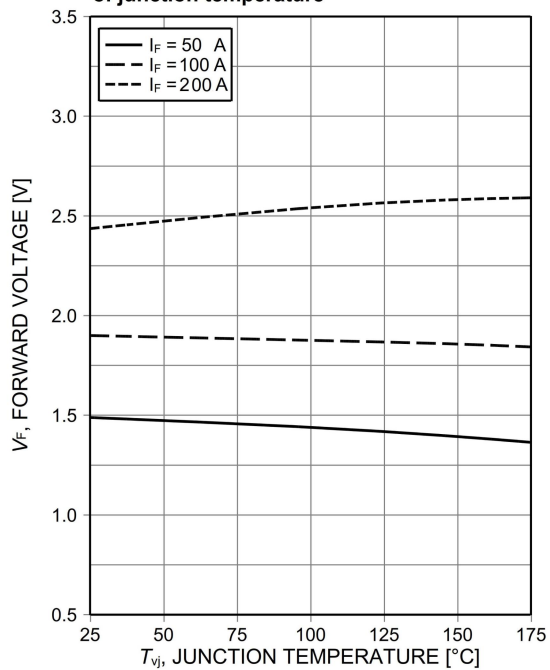
Typical diode peak rate of fall of reverse recovery current as a function of diode current slope
($V_R=600V$)



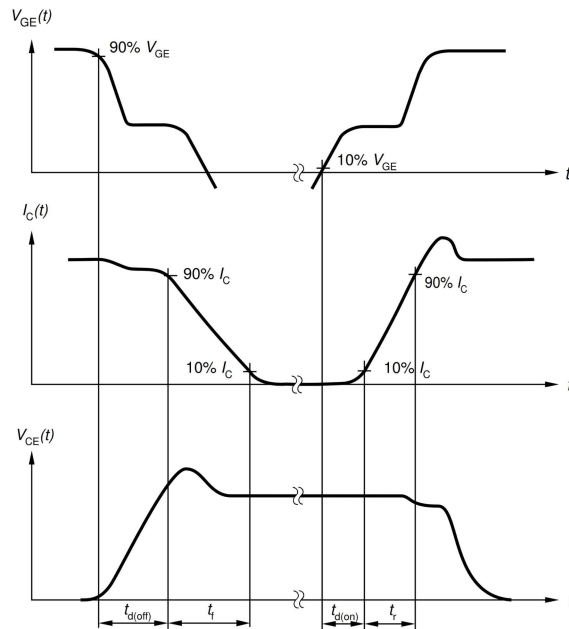
Typical diode forward current as a function of forward voltage



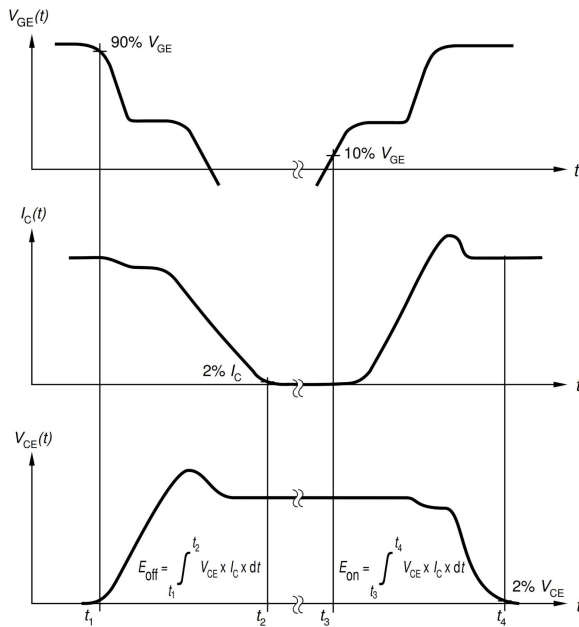
Typical diode forward voltage as a function of junction temperature



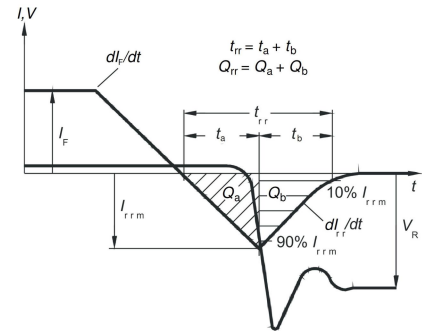
Testing Conditions



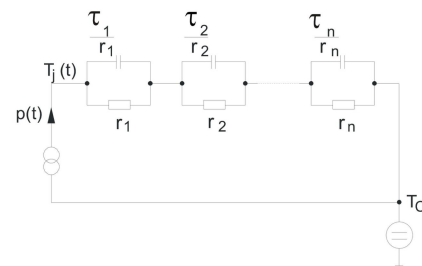
Definition of switching times



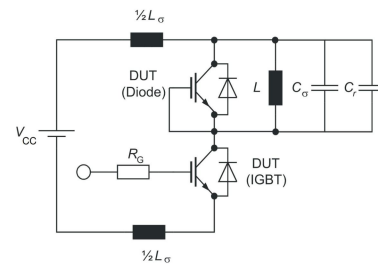
Definition of switching losses



Definition of diode switching characteristics

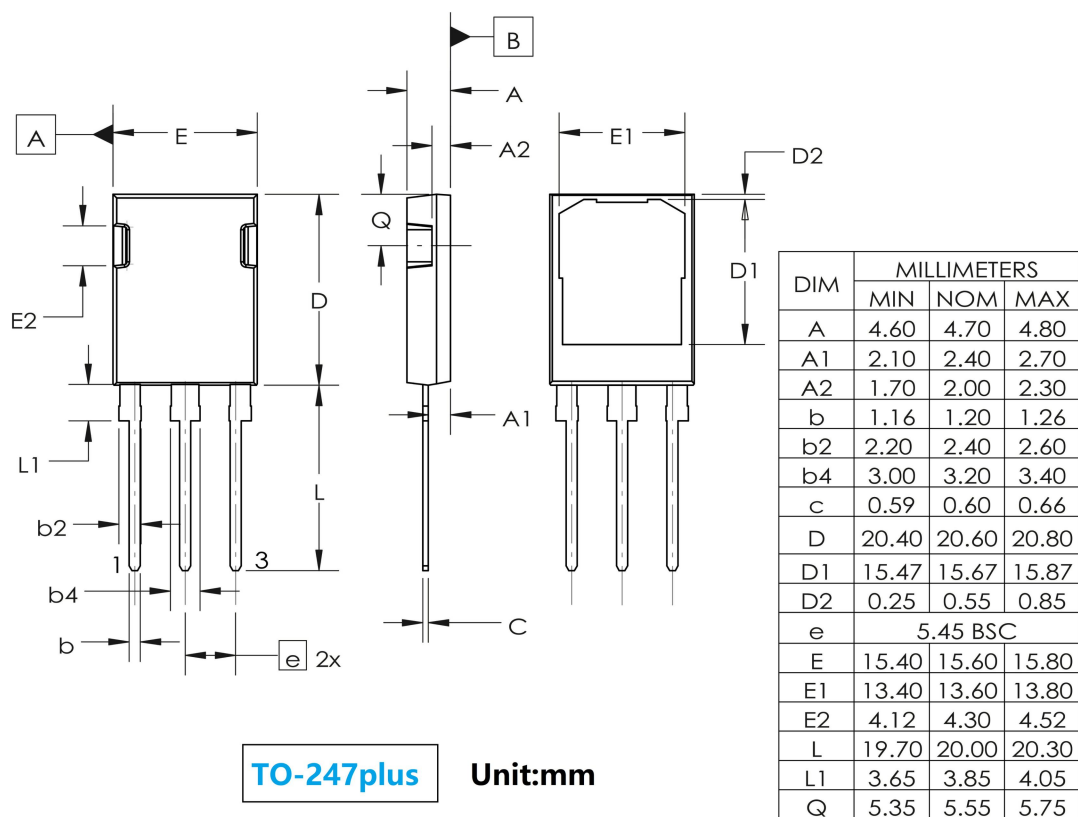
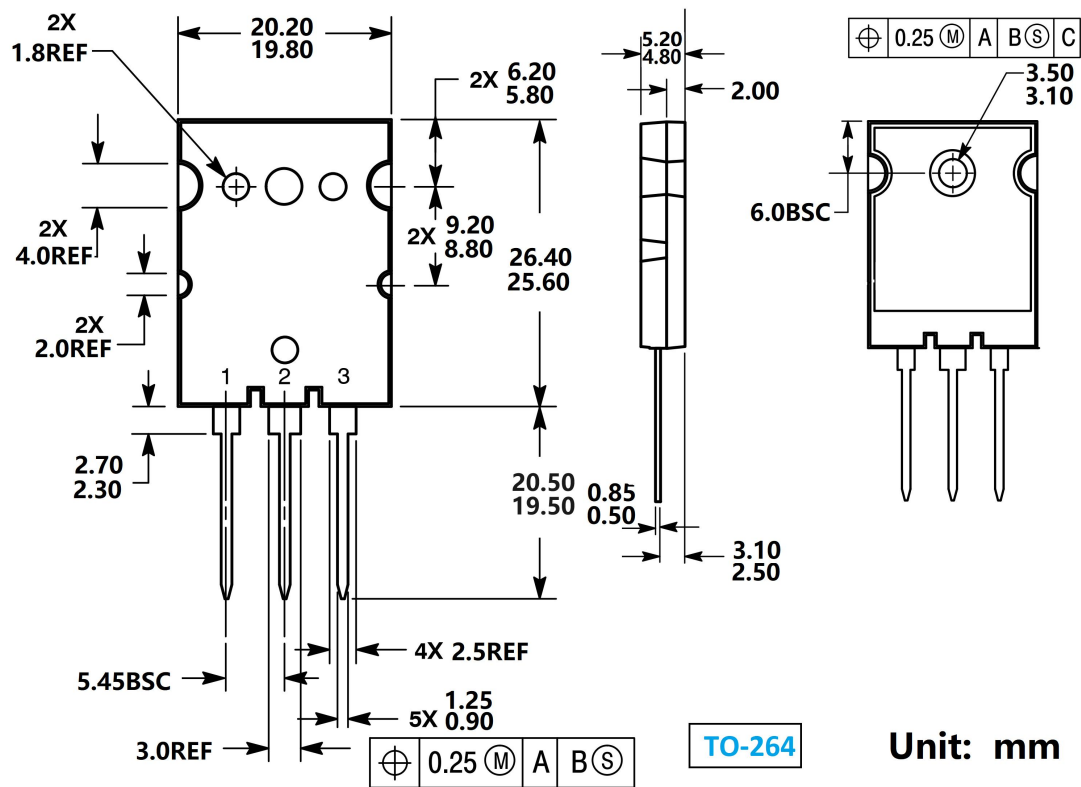


Thermal equivalent circuit



Dynamic test circuit
Parasitic inductance L_{σ} ,
parasitic capacitor C_{σ} ,
relief capacitor C_r ,
(only for ZVT switching)

Package Mechanical DATA



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[MSG100T120FQC1](#) [MSG75T120FQC1](#) [MSG30T65FT](#) [MSG70T170HLB3](#) [MSG75D65HFC0](#) [MSG100T120FQW](#) [FGW40N120WD](#)
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