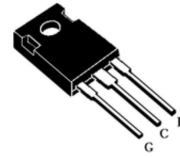


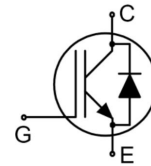
Features

- Low gate charge
- FS Technology
- Saturation voltage: $V_{CE(sat),typ} = 1.75V @ I_C=25A$ and $T_C=25^\circ C$
- RoHS product



Applications

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



Order Codes	Marking	Package
MSG25T120FQC	MSG25T120FQC	TO-247

Absolute Ratings (T_c=25°C)

Parameter	Symbol	MSG25T120FQC	Unit
Collector-Emmitter Voltage	V _{ces}	1200	V
Collector Current-continuous	I _c T=25°C	50	A
		25	A
Collector Current-pulse(note 1)	I _{CM}	60	A
Diode forward current @ T _C = 100°C	I _F	25	A
Gate-Emmitter Voltage	V _{GES}	±20	V
Turn-off safe area	-	60	A
Power Dissipation	P _D T _C =25°C	350	W
Diode Forward Current	T _C =100°C	25	A
Operating and Storage Temperature Range	T _J , T _{STG}	-55~+150	°C
Maximum Lead Temperature for Soldering Purposes	T _L	300	°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}	$I_C=500\mu A, V_{GE}=0V$	1200	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	$I_C=1mA$, referenced to 25°C	-	0.6	-	V/°C
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_C=25^\circ C$	-	-	0.2	mA
		$T_C=100^\circ C$	-	-	2	mA
		$T_C=150^\circ C$	-	-	2.5	mA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-100	nA
On-Characteristics						
Gate-Emmitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=600\mu A$	4.5	-	6.5	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=25A$	-	1.75	2.5	V
		$T_C=25^\circ C$	-	2	-	
		$T_C=150^\circ C$	-	2.1	-	
Short Collector current (Note 2)	$I_C(sc)$	$V_{GE}=15V$ $V_{CE}=600V$ tsc< 10us $T_C=25^\circ C$		160		A
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1.0MHz$	-	1600	2400	pF
Output capacitance	C_{oes}		-	120	190	pF
Reverse transfer capacitance	C_{res}		-	80	130	pF
Switching Characteristics						
Turn-On delay time	$t_d(on)$	$V_{CE}=600V, I_C=25A,$ $R_G=10\Omega$ $T_C=25^\circ C$ Inductive Load	-	93	-	ns
Turn-On rise time	t_r		-	77	-	ns
Turn-off delay time	$t_d(off)$		-	216	-	ns
Turn-off Fall time	t_f		-	108	-	ns
Turn-on energy	E_{on}		-	2.8	-	mJ
Turn-off energy	E_{off}		-	1.0	-	mJ
Total switching Energy	E_{total}		-	3.8	-	mJ
Total Gate Charge	Q_g	$V_{CE}=600V, I_C=25A,$ $V_{GE}=15V$ (note3,4)	-	120	-	nC
Anti-Paraller Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=25A$	-	1.77	2.8	V

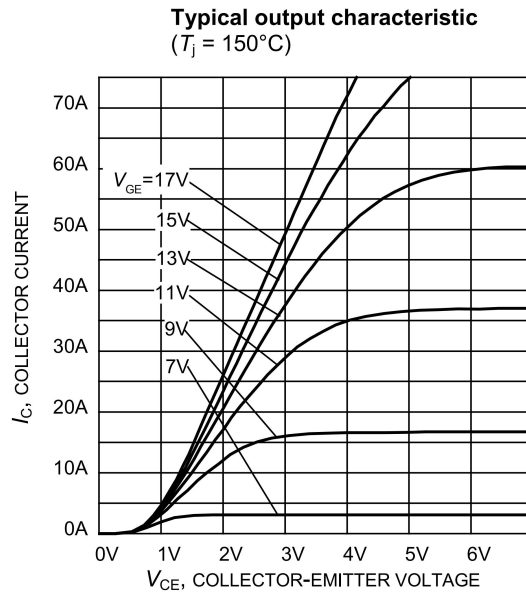
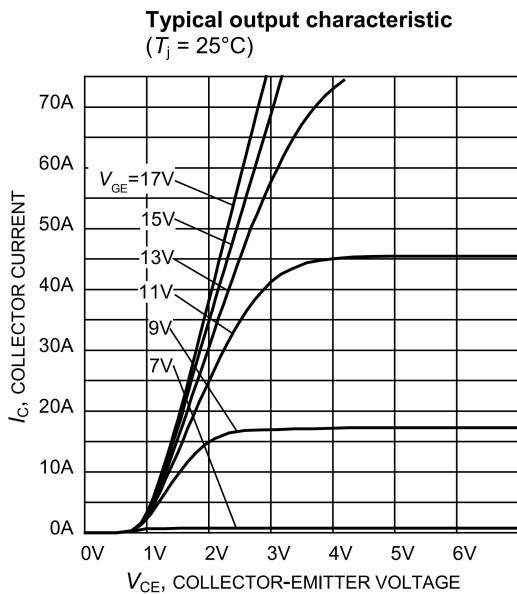


Diode Reverse recovery time	t_{rr}	VGE=0V, VR=800V IF=25A	-	236	-	ns
Reverse recovery charge	Q_{rr}	dl=dt=200/us (note 4)	-	1.3	-	uC
Parameter		Symbol	Max	Unit		
Thermal Resistance, Junction to Case		$R_{th(j-c)}$	0.4	°C/W		
Thermal Resistance, Junction to Ambient		$R_{th(j-A)}$	40	°C/W		

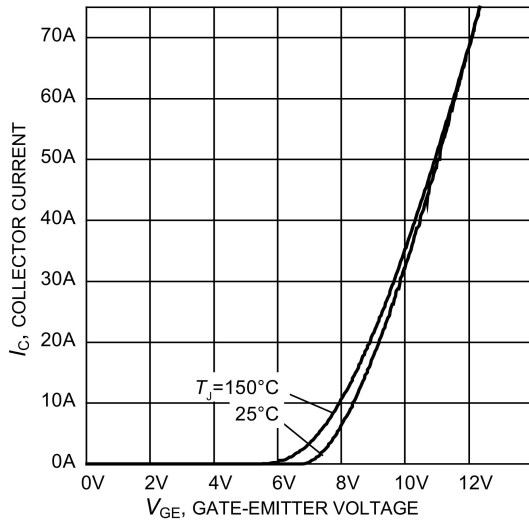
Notes:

- 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 ≤300us, Duty Cycles2%
- 4: Essentially independent of operating temperature

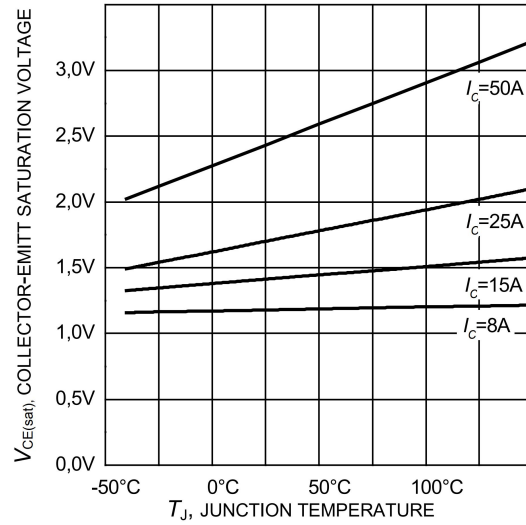
Electrical Characteristics(curves)



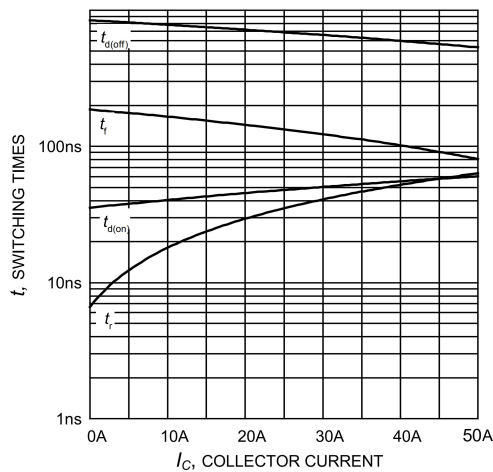
Typical transfer characteristic
($V_{CE}=20V$)



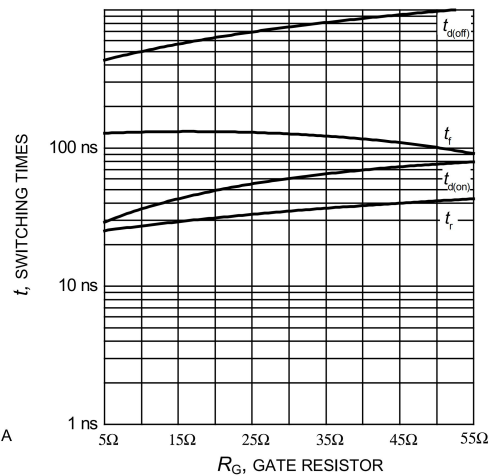
Typical collector-emitter saturation voltage
as a function of junction temperature
($V_{GE} = 15V$)



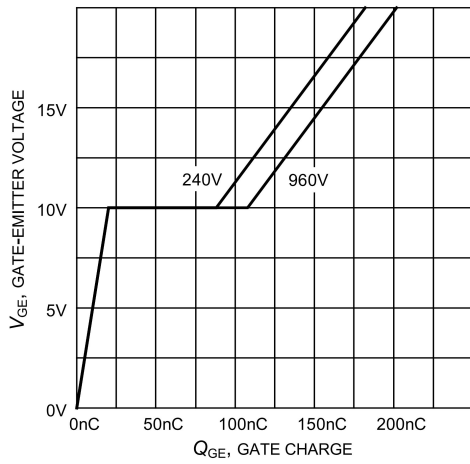
Typical switching times as a function of gate resistor (inductive load, $T_J=150^\circ C$, $V_{CE}=600V$, $V_{GE}=0/15V$, $R_G=22\Omega$)



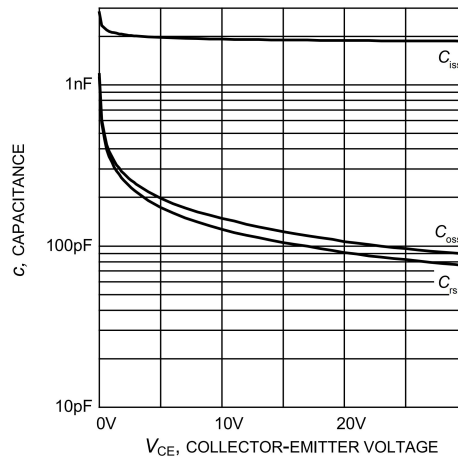
Typical switching times as a function of gate resistor (inductive load, $T_J=150^\circ C$, $V_{CE}=600V$, $V_{GE}=0/15V$, $I_C=25A$)



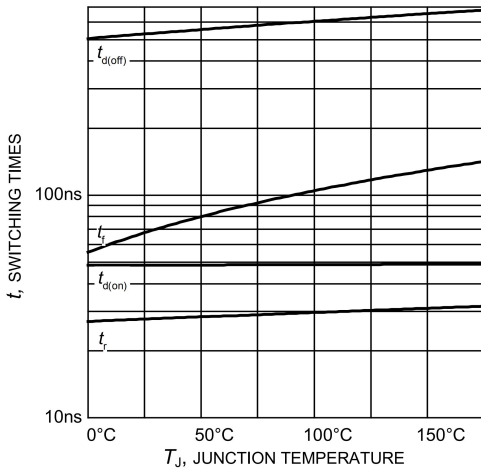
Typical gate charge ($I_C=25\text{ A}$)



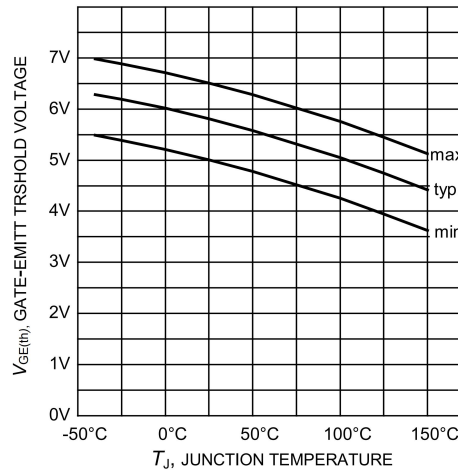
Typical capacitance as a function of collector-emitter voltage ($V_{GE}=0\text{V}$, $f=1\text{ MHz}$)



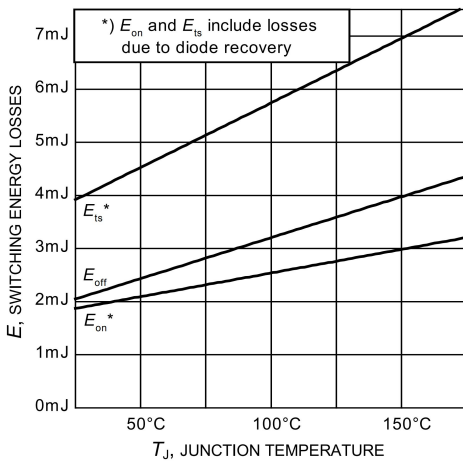
Typical switching times as a function of junction temperature (inductive load, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=25\text{A}$, $R_G=22\Omega$.)



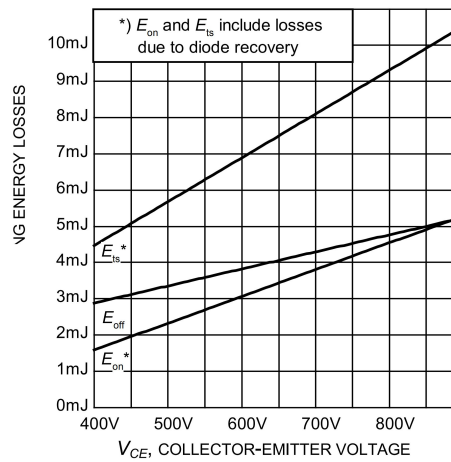
Gate-emitter threshold voltage as a function of junction temperature ($I_C=1.0\text{mA}$)



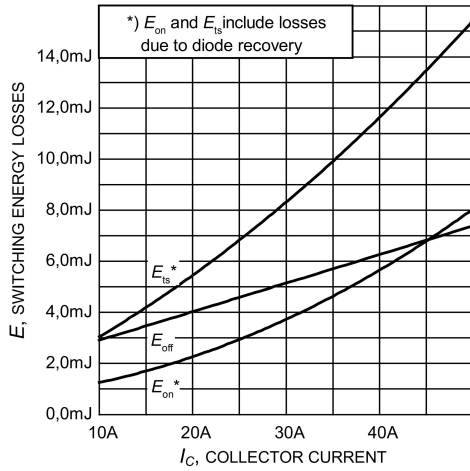
Typical switching energy losses as a function of junction temperature (inductive load, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=25\text{A}$, $R_G=22\Omega$)



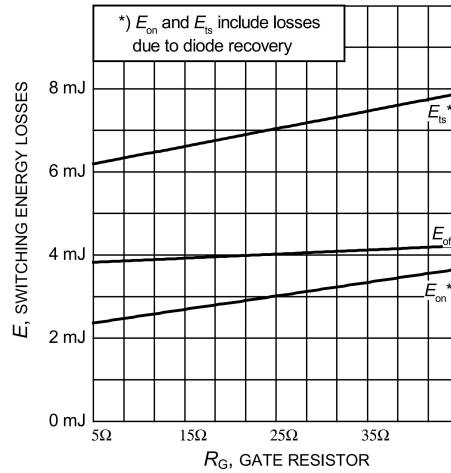
Typical switching energy losses as a function of collector emitter voltage (inductive load, $V_{GE}=0/15\text{V}$, $I_C=25\text{A}$, $R_G=22\Omega$, $T_J=150^\circ\text{C}$.)



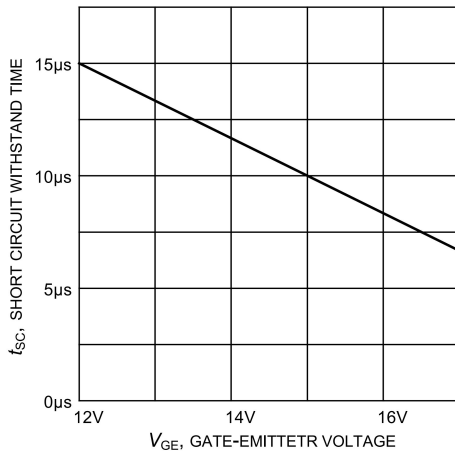
Typical switching energy losses as a function of collector current (inductive load, $T_J=150^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $R_G=22\Omega$.)



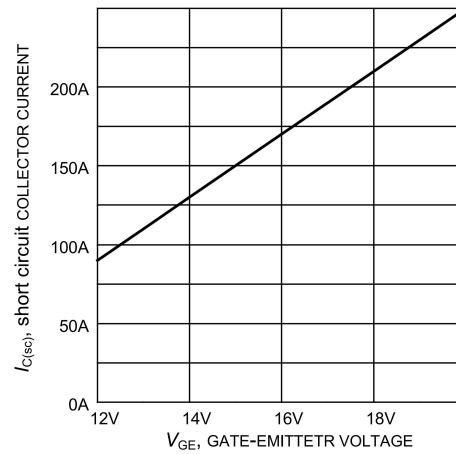
Typical switching energy losses as a function of gate resistor (inductive load, $T_J=150^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=25\text{A}$.)



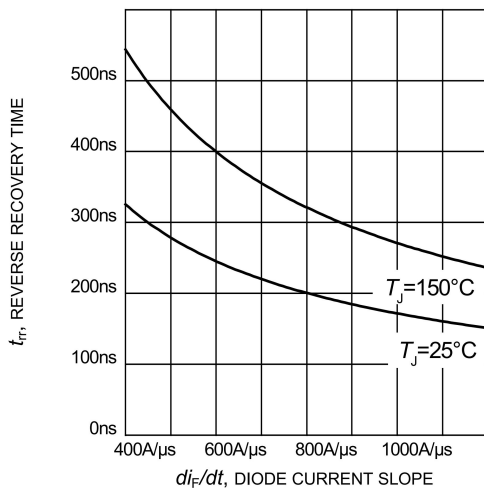
Short circuit withstand time as a function of gate-emitter voltage ($V_{CE}=600\text{V}$, start at $T_J=25^\circ\text{C}$)



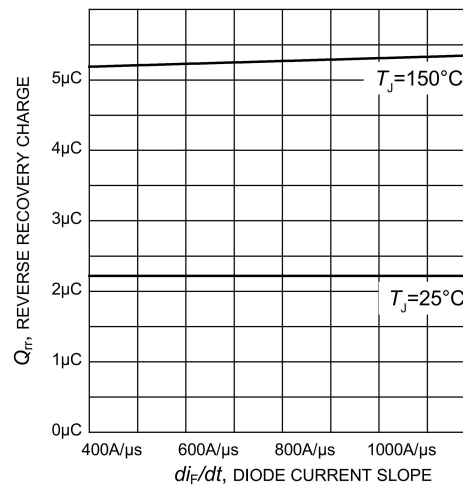
Typical short circuit collector current as a function of gate-emitter voltage ($V_{CE} \leq 600\text{V}$, $T_J \leq 150^\circ\text{C}$)



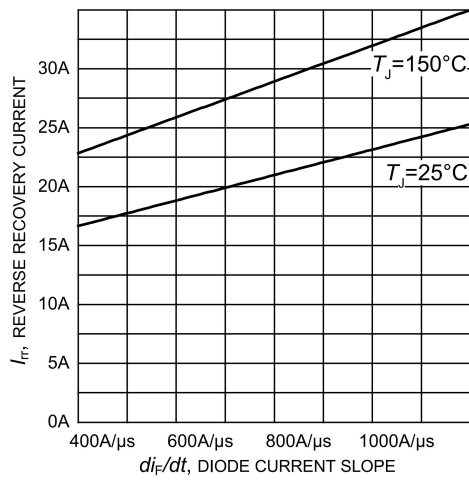
Typical reverse recovery time as a function of diode current slope ($V_R=600\text{V}$, $I_F=25\text{A}$)



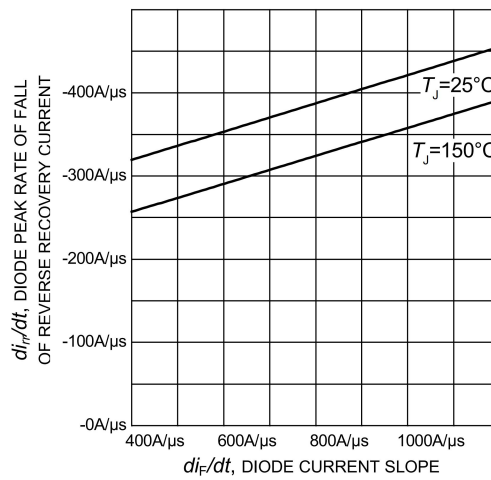
Typical reverse recovery charge as a function of diode current slope ($V_R=600\text{V}$, $I_F=25\text{A}$)



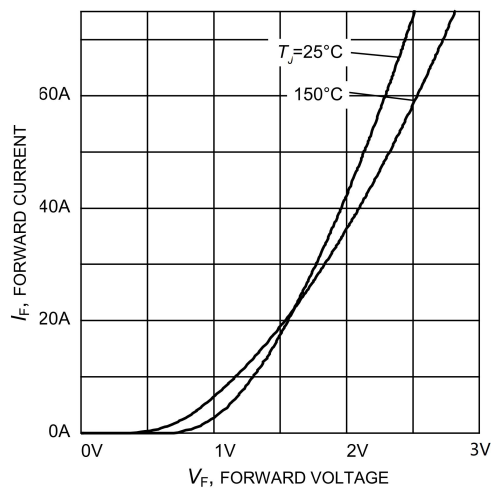
Typical reverse recovery current as a function of diode current slope
($V_R=600V$, $I_F=25A$)



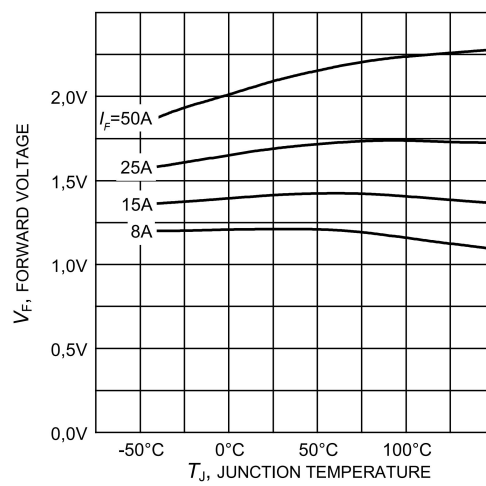
Typical diode peak rate of fall of reverse recovery current as a function of diode current slope
($V_R=600V$, $I_F=25A$)



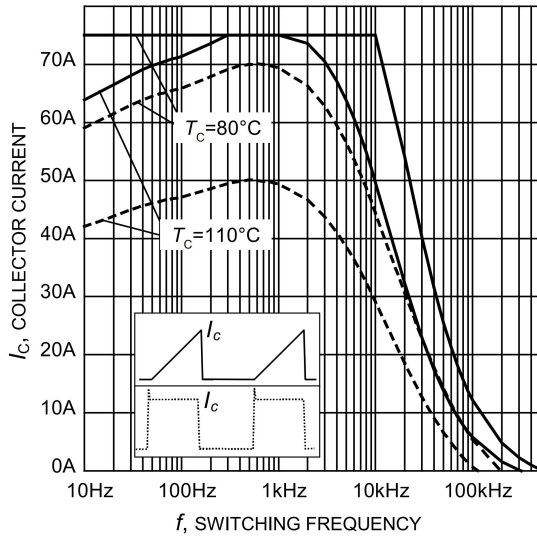
Typical diode forward current as a function of forward voltage



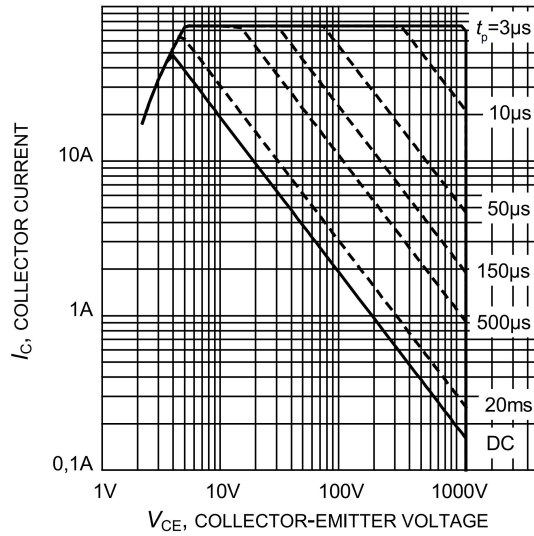
Typical diode forward voltage as a function of junction temperature



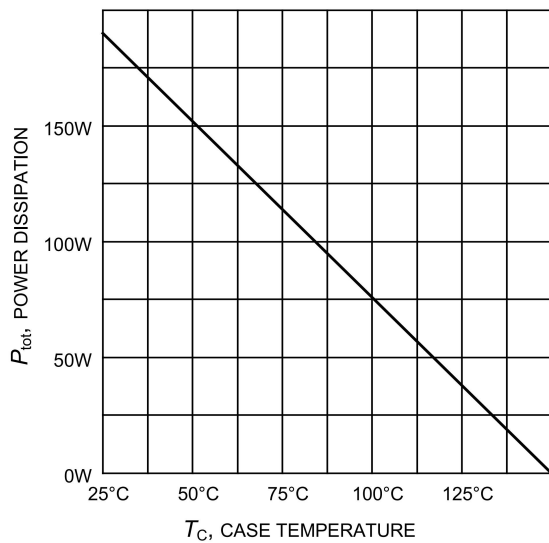
Collector current as a function of switching frequency ($T_j \leq 150^\circ\text{C}$, $D = 0.5$, $V_{CE} = 600\text{V}$, $V_{GE} = 0/+15\text{V}$, $R_G = 22\Omega$)



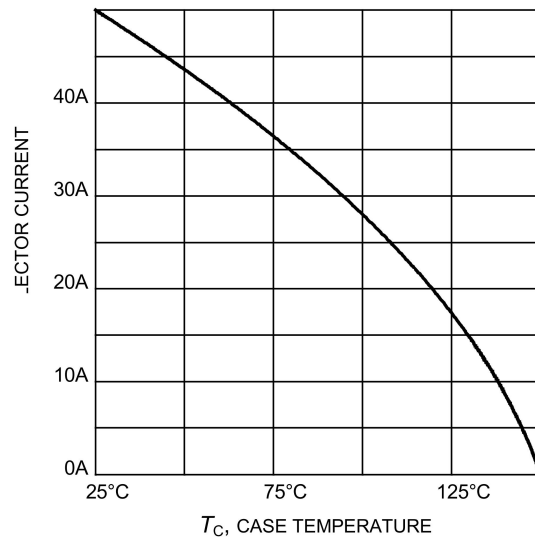
Safe operating area ($D = 0$, $T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$; $V_{GE} = 15\text{V}$)



Power dissipation as a function of case temperature ($T_j \leq 150^\circ\text{C}$)



Collector current as a function of case temperature ($V_{GE} \geq 15\text{V}$, $T_j \leq 150^\circ\text{C}$)



Package Mechanical DATA

