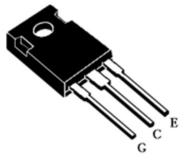
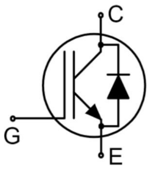
Features



- Low gate charge
- FS Technology
- Saturation voltage:VCE(sat),typ= 1.75V @ IC=25A and TC=25℃
- RoHS product

Applications



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

Order Codes	Marking	Package
MSG25T120FQC	MSG25T120FQC	TO-247

Absolute Ratings（Tc=25℃）

Parameter	Symbol	MSG25T120FQC	Unit
Collector-Emitter Voltage	Vces	1200	V
Collector Current-continuous	Ic T=25℃	50	A
	T=100℃	25	A
Collector Current-pulse(note 1)	I_{CM}	60	A
Diode forward current @ TC= 100°C	I_F	25	A
Gate-Emitter Voltage	V_{GES}	±20	V
Turn-off safe area	-	60	A
Power Dissipation	P_D T_C=25℃	350	W
Diode Forward Current	T_C=100℃	25	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-Emitter Voltage	BV_{CES}	I_C=500uA,V_{GE}=0V	1200	-	-	V
Breakdown Voltage Temperature Coefficient	△BV_{CES}/△T_J	I_C=1mA,referenced to 25℃	-	0.6	-	V/℃
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V,T_C=25℃	-	-	0.2	mA
		TC=100℃			2	mA
		TC=150℃	-	-	2.5	mA
Gate-body leakage current, forward	I_{GESF}	V_{CE}=0V,V_{GE}=-20V	-	-	-100	nA
On-Characteristics						
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	VCE=VGE,Ic=600uA	4.5	-	6.5	V
Collector-Emitter saturation Voltage	VCESAT	V_{GE}=15V,I_C=25A	-	1.75	2.5	V
		Tc=25℃	-	2	-	
		T_C=150℃	-	2.1	-	
Short Collector current (Note 2)	Ic(sc)	VGE=15V VCE=600V tsc<10us Tc=25℃		160		A
Dynamic Characteristics						
Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ	-	1600	2400	pF
Output capacitance	Coes		-	120	190	pF
Reverse transfer capacitance	Cres		-	80	130	pF
Switching Characteristics						
Turn-On delay time	t_d(on)	V_{CE}=600V,Ic=25A, R_G=10Ω Tc=25℃ 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	Qg	VCE=600V,Ic=25A,VGE=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 di/dt=200/us (note 4)	-	236	-	ns
Reverse recovery charge	Q_{rr}		-	1.3	-	uC

Thermal chatateristics

Symbol	Parameter	Max	Unit
$R_{th(j-c)}$	Thermal Resistance,Junction to Case	0.4	℃/W
$R_{th(j-A)}$	Thermal Resistance,Junction to Ambience	40	℃/W

Notes:

1: Pulse width limited by maximum junction temperature

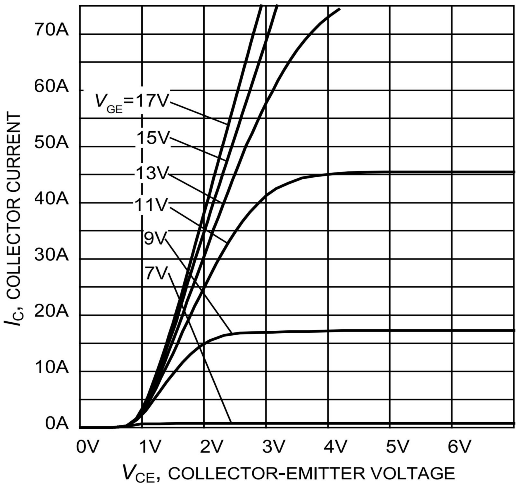
2: Allowed number of short circuits:<1000; time between short circuits:>1s.

3: Pulse Test: Pulse Width ≤300us, Duty Cycles2%

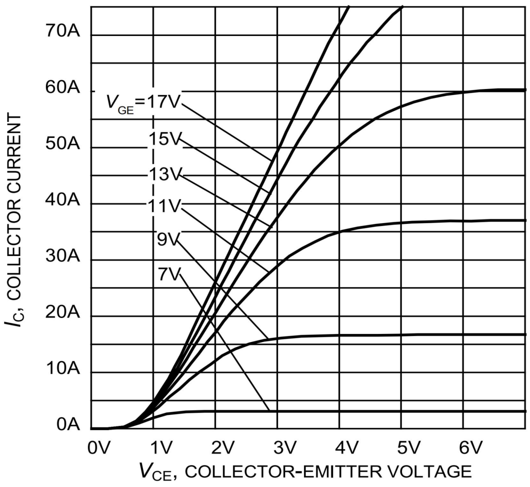
4: Essentially independent of operating temperature

Electrical Characteristics(curves)

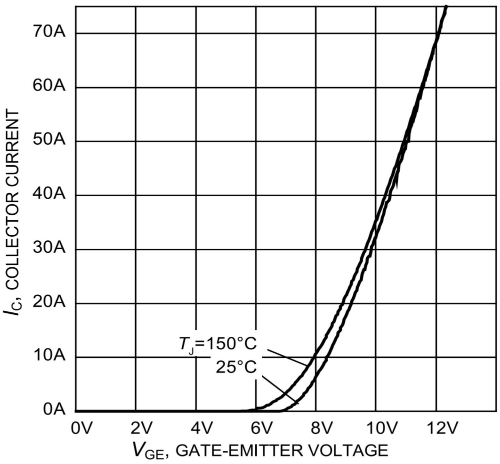
Typical output characteristic
(T_j = 25°C)



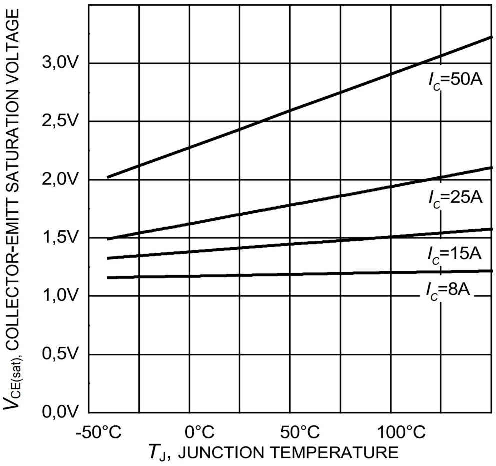
Typical output characteristic
(T_j = 150°C)



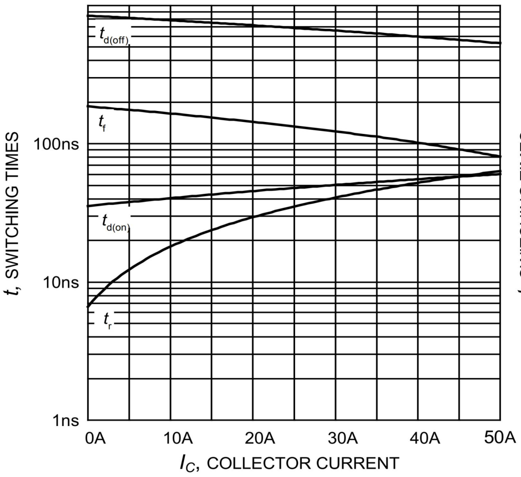
Typical transfer characteristic
(V_{CE}=20V)



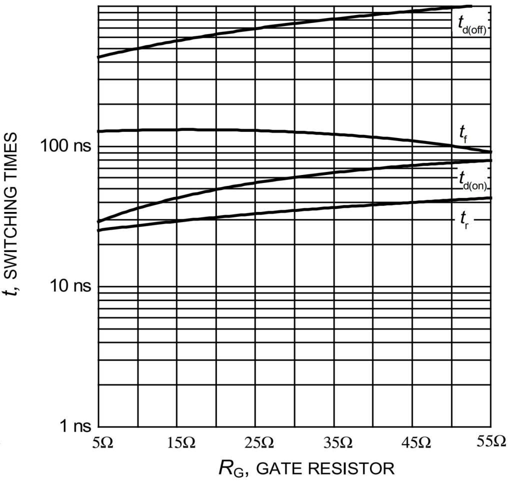
Typical collector-emitter saturation voltage as a function of junction temperature
(V_{GE} = 15V)



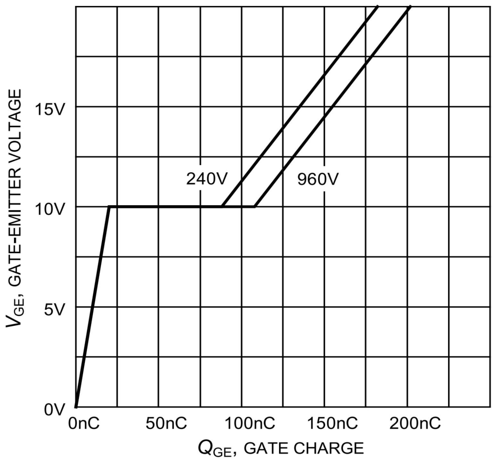
Typical switching times as a function of gate resistor (inductive load, T_J=150°C, V_{CE}=600V, V_{GE}=0/15V, R_G=22Ω)



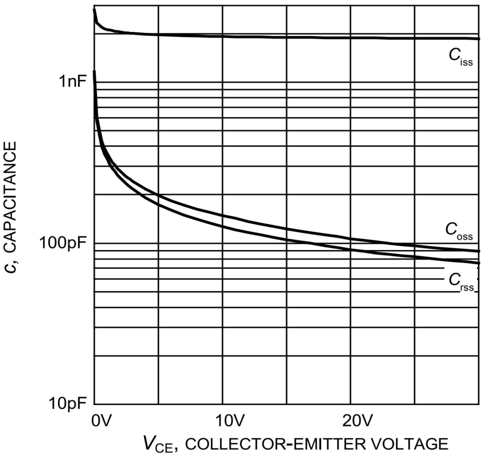
Typical switching times as a function of gate resistor (inductive load, T_J=150°C, V_{CE}=600V, V_{GE}=0/15V, I_C=25A)



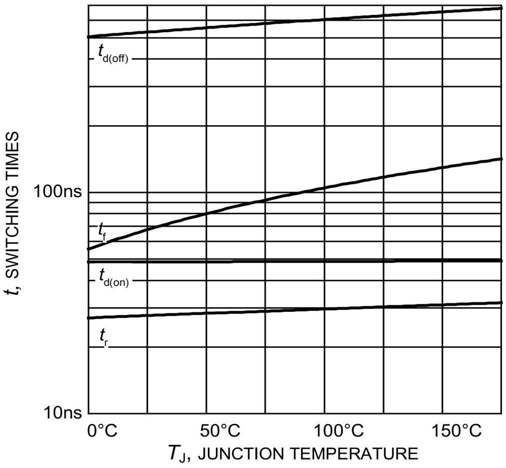
Typical gate charge (I_C=25 A)



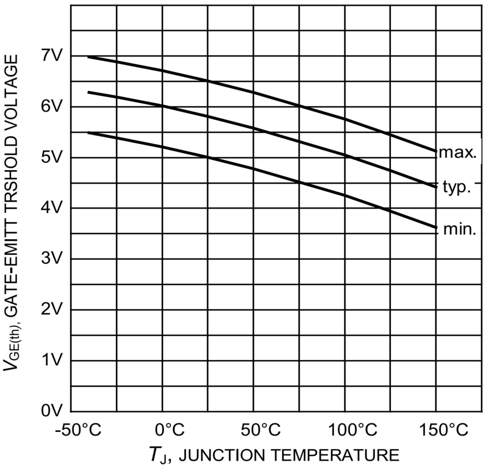
Typical capacitance as a function of collector-emitter voltage
(V_{GE}=0V, f = 1 MHz)



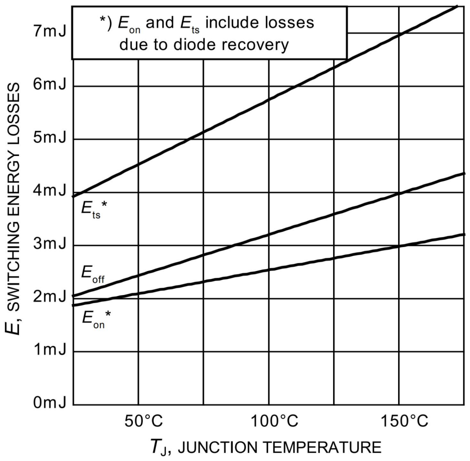
Typical switching times as a function of junction temperature (inductive load, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, R_G=22Ω,)



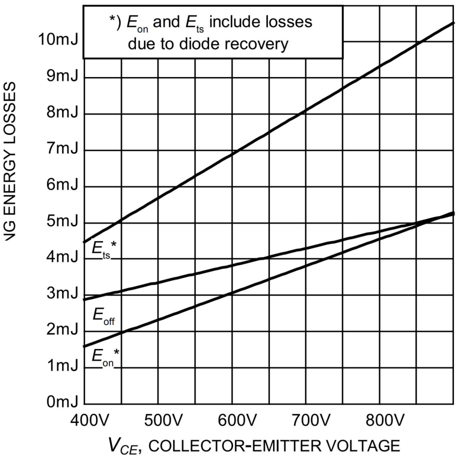
Gate-emitter threshold voltage as a function of junction temperature (I_C = 1.0mA)



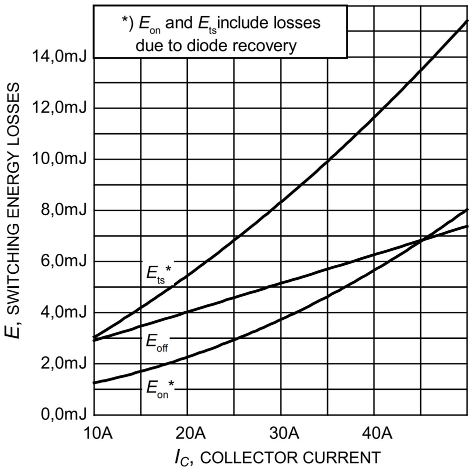
Typical switching energy losses as a function of junction temperature (inductive load, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, R_G=22Ω)



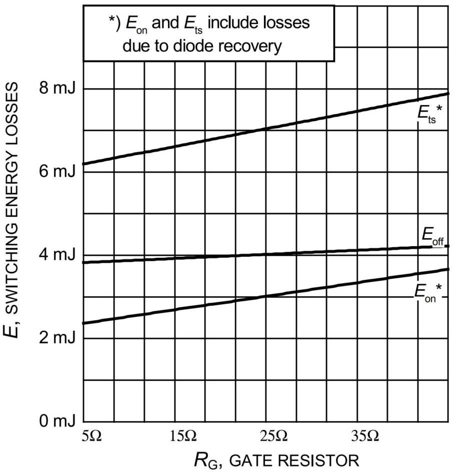
Typical switching energy losses as a function of collector emitter voltage (inductive load, V_{GE}=0/15V, I_C=25A, R_G=22Ω, T_J=150°C,)



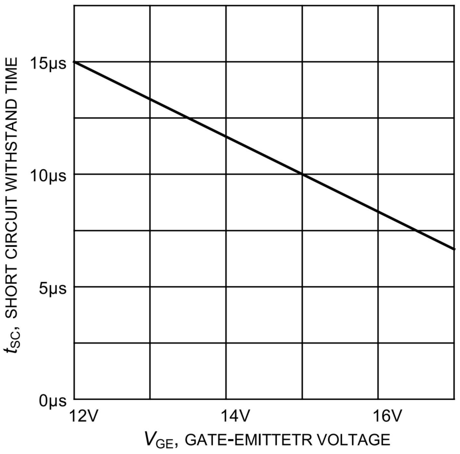
Typical switching energy losses as a function of collector current (inductive load, T_J=150°C, V_{CE}=600V, V_{GE}=0/15V, R_G=22Ω,)



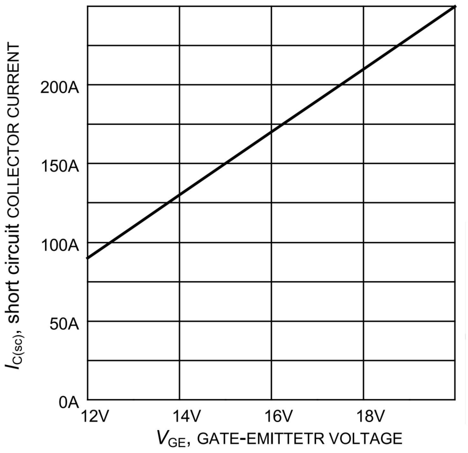
Typical switching energy losses as a function of gate resistor (inductive load, T_J=150°C, V_{CE}=600V, V_{GE}=0/15V, I_C=25A,)



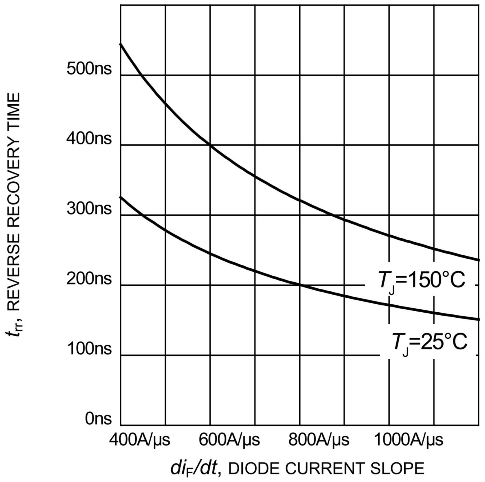
Short circuit withstand time as a function of gate-emitter voltage
(V_{CE}=600V, start at T_J=25°C)



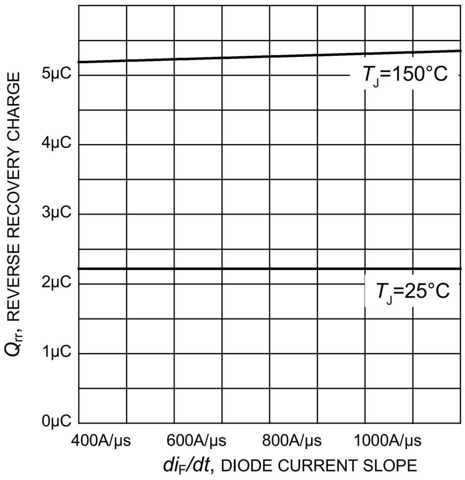
Typical short circuit collector current as a function of gate-emitter voltage (V_{CE} ≤ 600V, T_j ≤ 150°C)



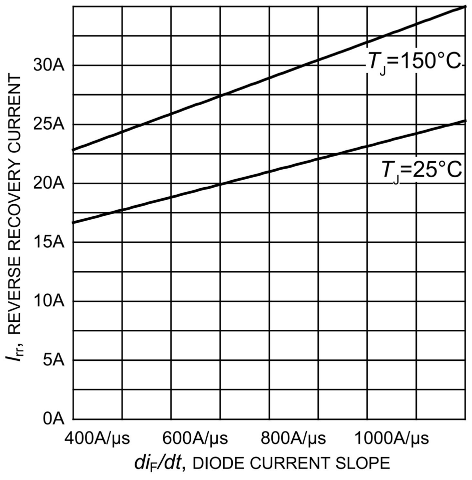
Typical reverse recovery time as a function of diode current slope (V_R=600V, I_F=25A)



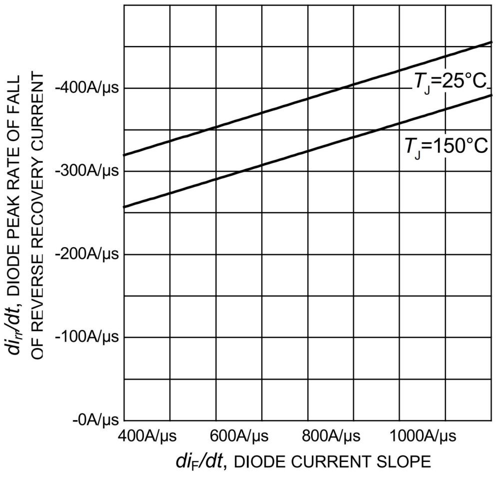
Typical reverse recovery charge as a function of diode current slope (V_R=600V, I_F=25A)

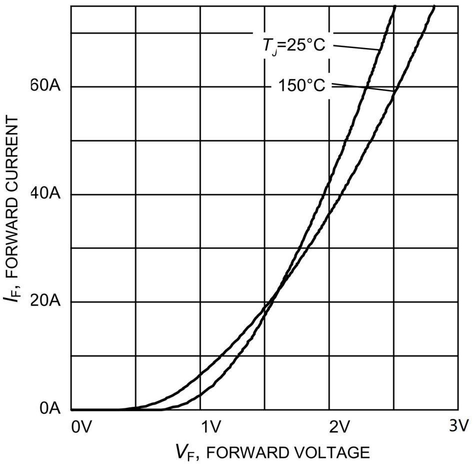


Typical reverse recovery current as a function of diode current slope
(V_R=600V, I_F=25A)

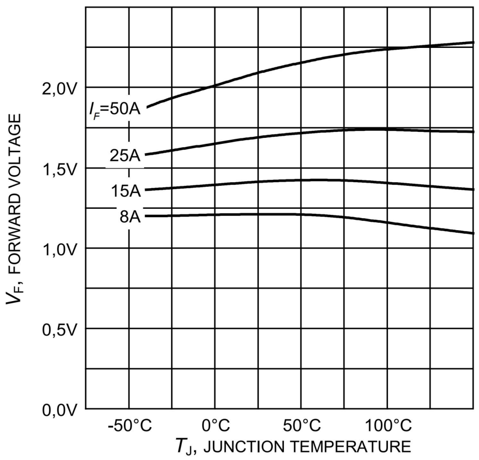


Typical diode peak rate of fall of reverse recovery current as a function of diode current slope
(V_R=600V, I_F=25A)

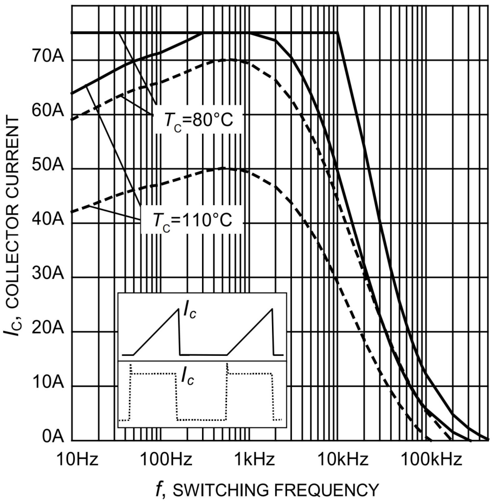




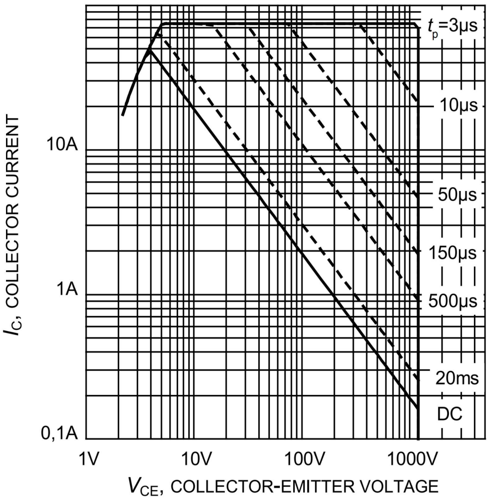
Typical diode forward current as a function of forward voltage



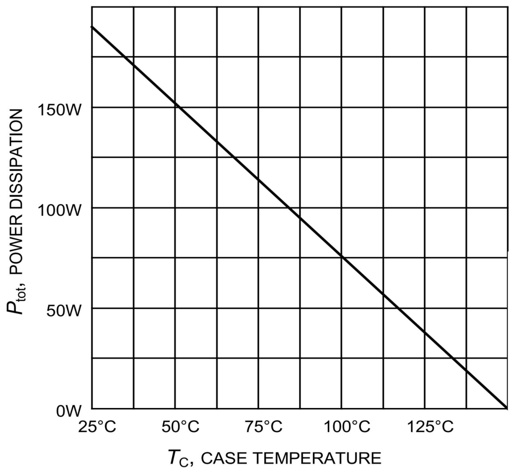
Typical diode forward voltage as a function of junction temperature



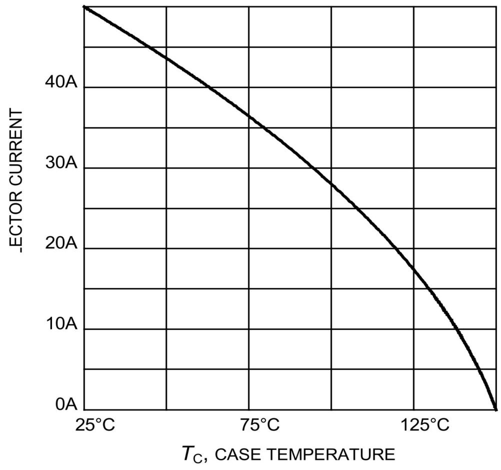
Collector current as a function of switching frequency ($T_j \le 150$°C, D = 0.5, V_{CE} = 600V, V_{GE} = 0/+15V, R_G = 22Ω)



Safe operating area (D = 0, T_C = 25°C, $T_j \le 150$°C; V_{GE}=15V)



Power dissipation as a function of case temperature ($T_j \le 150$°C)



Collector current as a function of case temperature ($V_{GE} \ge 15$V, $T_j \le 150$°C)

Package Mechanical DATA