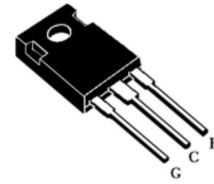


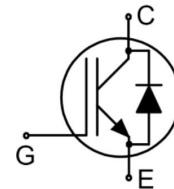
Features

- Low gate charge
- FS Technology
- Short circuit withstand time 10 us
- Saturation voltage: $V_{CE(sat), type} = 1.7V$



Applications

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



Order Message

Order codes	Marking	Package
MSG75T65FQC	MSG75T65FQC	TO-247

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

Parameter	Symbol	Value	Unit
		MSG75T65FQC	
Collector-Emitter Voltage	V_{ce}	650	V
Collector Current-continuous	$T=25^{\circ}C$	150	A
	$T=100^{\circ}C$	75	A
Collector Current-pulse (note 1)	I_{CM}	300	A
Gate-Emitter Voltage	V_{GES}	± 30	V
Turn-off safe area	-	75	A
Power Dissipation	PD $T_c=25^{\circ}C$	439	W
Operating and Storage Temperature Range	T_J, T_{STG}	$-55 \sim +150$	$^{\circ}C$
Maximum Lead Temperature for Soldering Purposes	T_L	300	$^{\circ}C$

1 Diode RMS forward current, $T_c=25^{\circ}C$ 150A $T_c=100^{\circ}C$ 75A

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_c=250\mu A, V_{GE}=0V$	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES} / \Delta T_J$	$I_c=0.5mA$, referenced to $25^\circ C$	-	0.6	-	$V/^\circ C$
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$	-	-	0.2	mA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	200	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-200	nA
On-Characteristics						
Gate 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}	$V_{GE}=15V, I_c=75A$ $T_c=25^\circ C$ $T_c=150^\circ C$	- -	1.7 2.0	2.2 -	V
Short Collector current(Note 2)	$I_{C(SC)}$	$V_{GE}=15V, V_{CE}=600V$ $t_{sc}<10\mu s, T_c=25^\circ C$		320		A
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1.0MHz$	-	5012	-	pF
Output capacitance	C_{oes}		-	430	-	pF
Reverse transfer capacitance	C_{res}		-	99.6	-	pF

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CE}=400V, I_c=75A,$ $R_G=7.9\Omega$ $T_c=25^\circ C$ Inductive Load	-	45	-	ns
Turn-On rise time	t_r		-	40	-	ns
Turn-Off delay time	$t_{d(off)}$		-	168	-	ns
Turn-Off Fall time	t_f		-	56	-	ns
Turn-on energy	E_{on}		-	2.32	-	mJ
Turn-off energy	E_{off}		-	0.97	-	mJ

Total switching energy	E_{total}		-	3.29	-	mJ
Total Gate Charge	Q_g	$V_{CE}=520V,$ $I_C=75A$ $V_{GE}=15V(\text{note 3,4})$	-	27.4		nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=75A$	-	2.2	2.9	V
Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=400V$ $I_F=75A$ $dI/dt=600A/\mu s$ (note 4)	-	75	-	ns
Reverse recovery charge	Q_{rr}		-	664	-	nC
Reverse recovery Current	I_{rr}		-	16	-	A

Thermal Characteristic

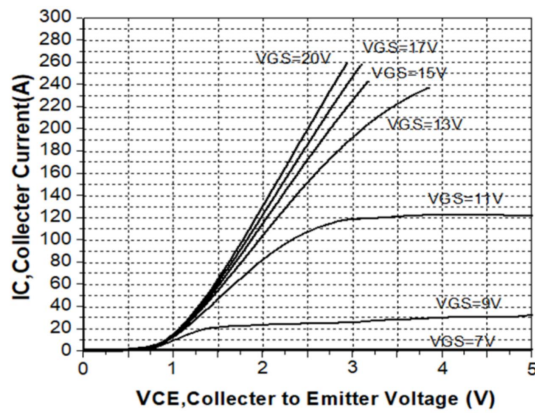
Parameter	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.23	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	33	$^{\circ}C/W$

Notes:

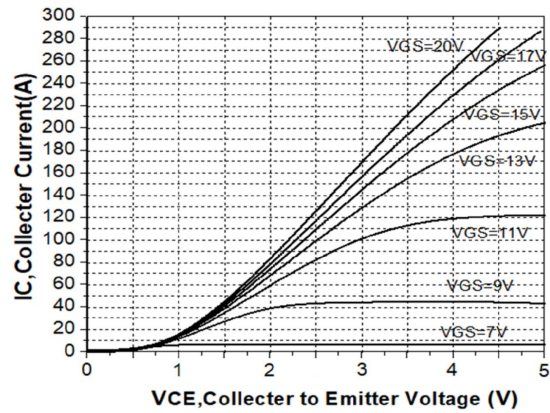
- 1: Pulse width limited by maximum junction temperature
- 2: Allowed number of short circuits: <1000; time between short circuits: >1s.
- 3: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycles 2%
- 4: Essentially independent of operating temperature

Electrical Characteristics (curves)

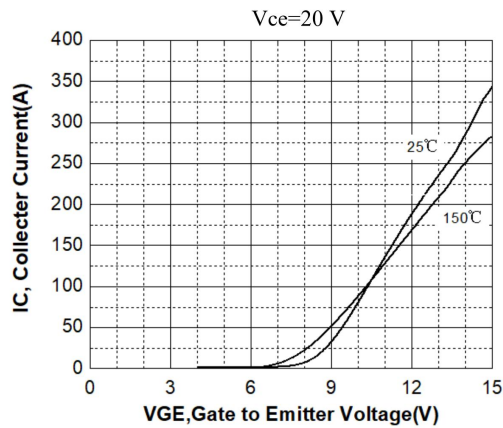
Output Characteristics (25°C)



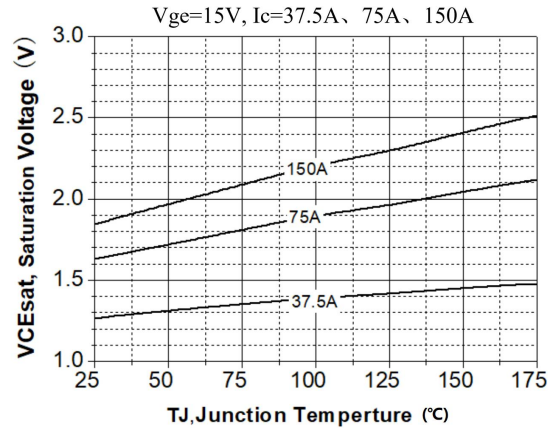
Output Characteristics (150°C)



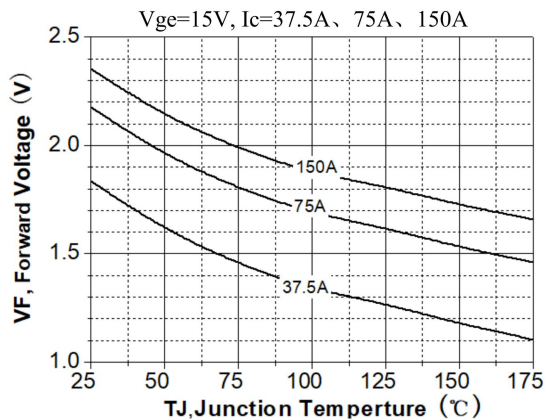
Transfer Characteristics



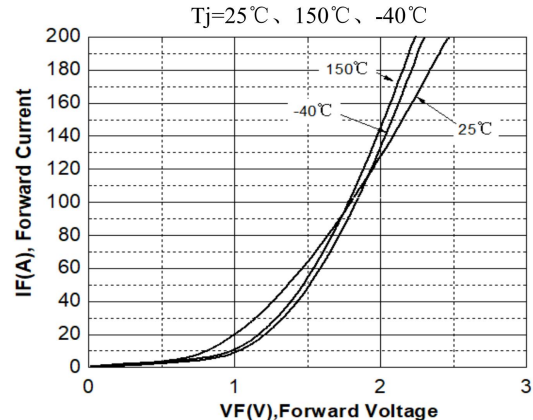
Vcesat vs. Tj



VF vs. Tj

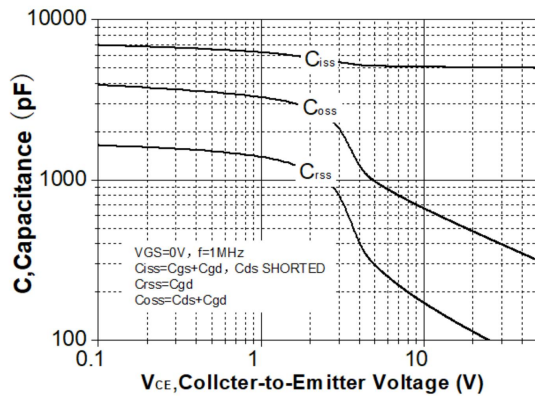


Diode Characteristic



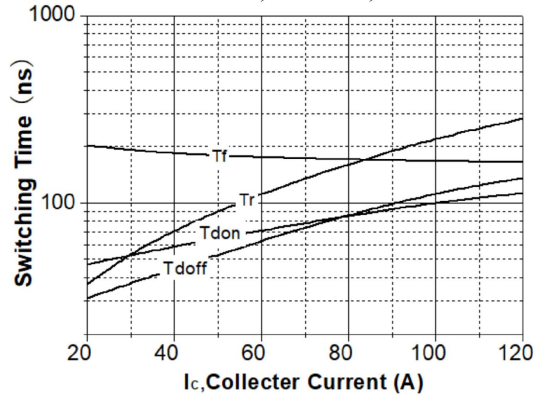
Capacitance Characteristic

$V_{ce}=25V, V_{GE}=0V, f=1.0MHz$



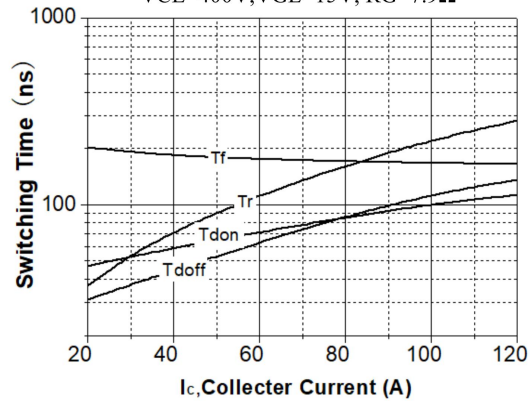
Switching Time vs. $I_C(25^\circ C)$

$V_{CE}=400V, V_{GE}=15V, R_G=7.9\Omega$



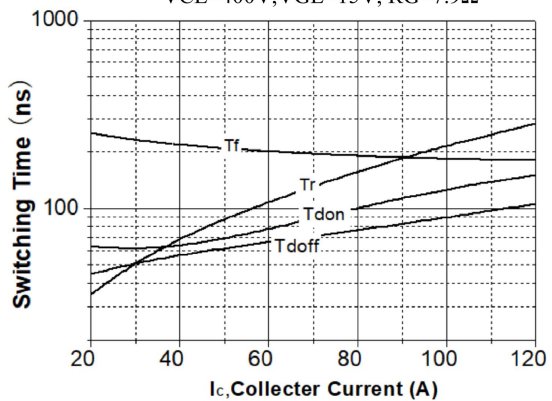
Switching Time vs. $I_C(25^\circ C)$

$V_{CE}=400V, V_{GE}=15V, R_G=7.9\Omega$



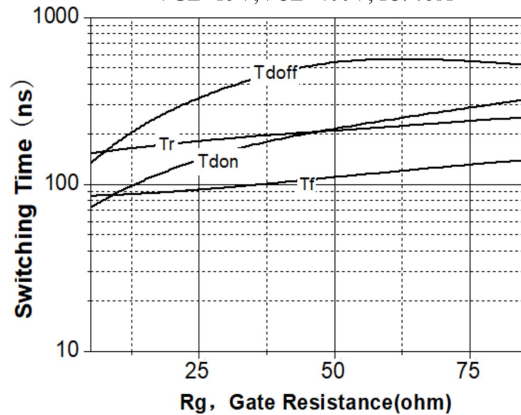
Switching Time vs. $I_C(150^\circ C)$

$V_{CE}=400V, V_{GE}=15V, R_G=7.9\Omega$



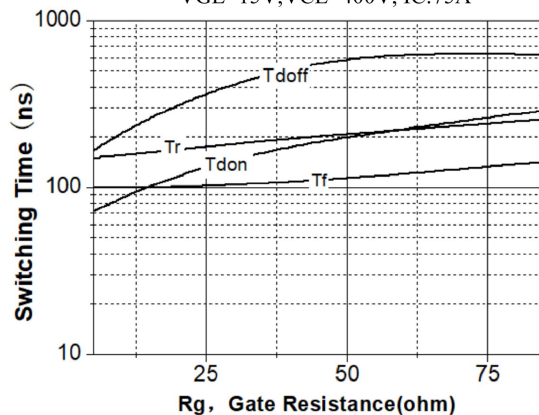
Switching Time vs. $R_g(25^\circ C)$

$V_{GE}=15V, V_{CE}=400V, I_C: 75A$

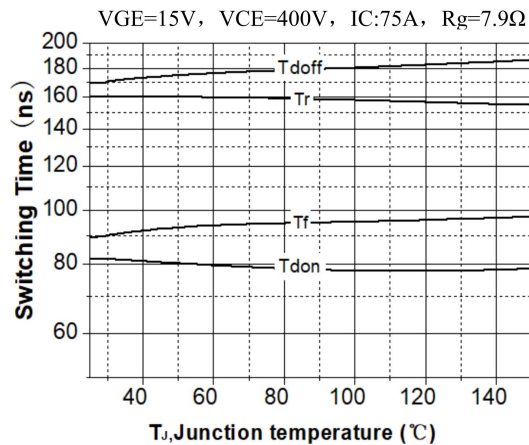


Switching Time vs. $R_g(150^\circ C)$

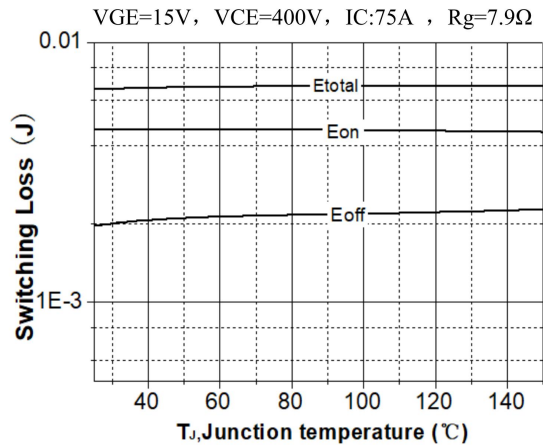
$V_{GE}=15V, V_{CE}=400V, I_C: 75A$



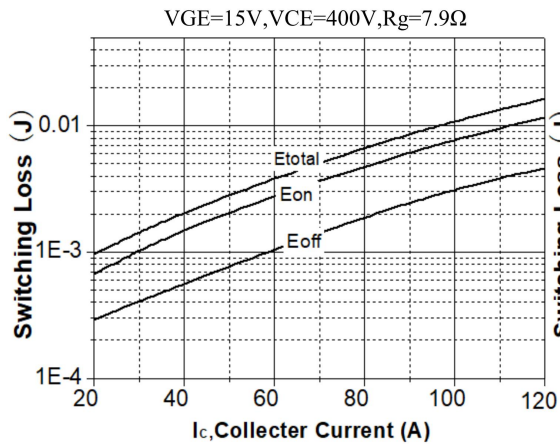
Switching Time vs. Tj



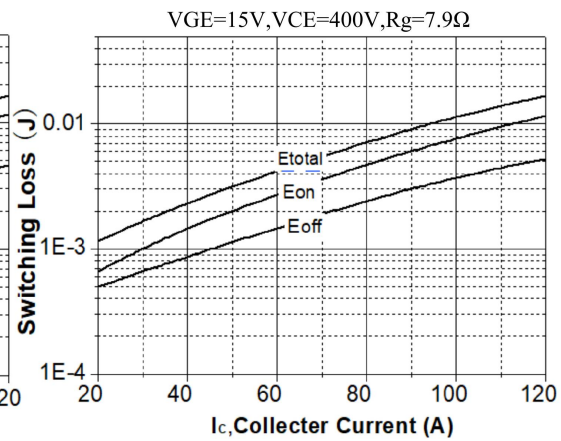
Switching Loss vs. Tj



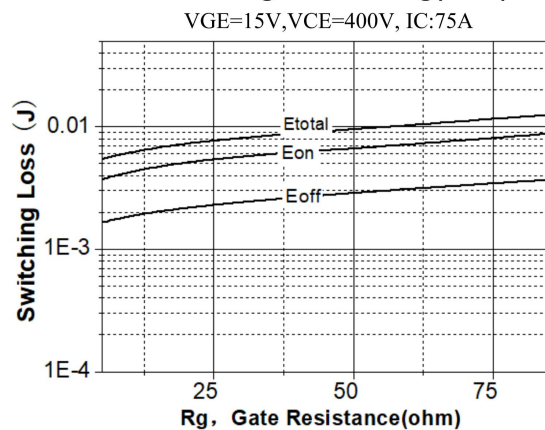
Switching Loss vs. IC(25°C)



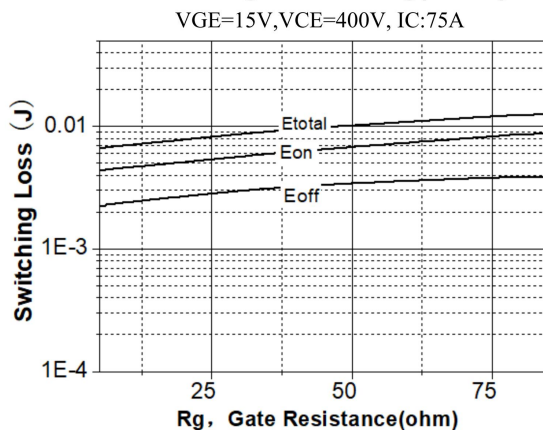
Switching Loss vs. IC(150°C)



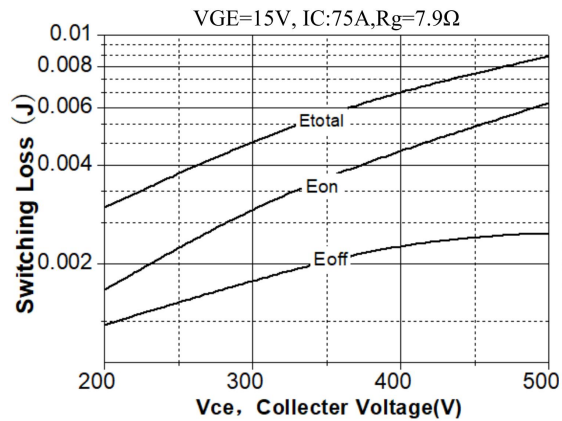
Switching Loss vs. Rg(25°C)



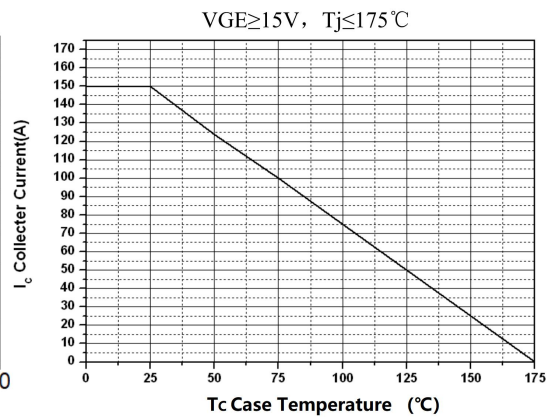
Switching Loss vs. Rg(150°C)



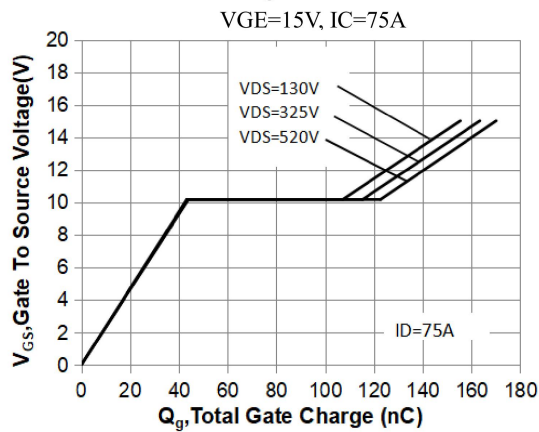
Switching Loss vs. VCE(150°C)



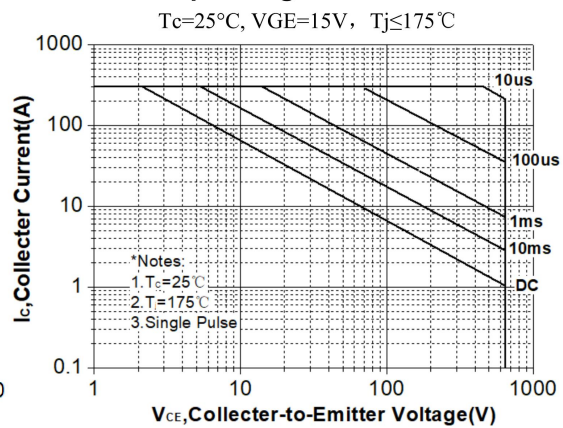
Collector current vs. case temperature



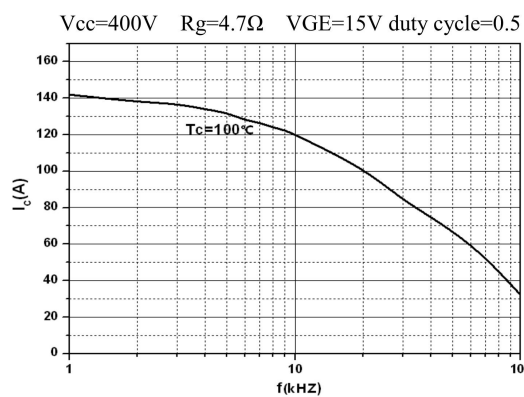
Gate Charge Characteristics



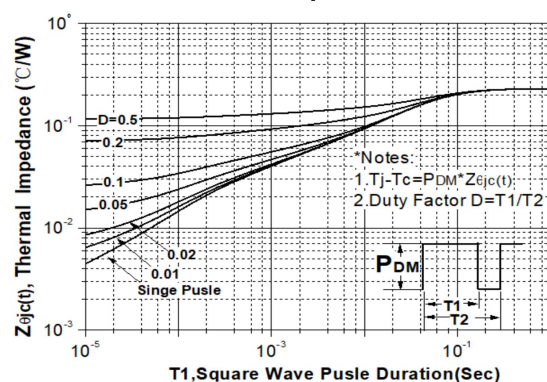
Safe Operating Area For TO-247



Ic vs. f



Transient Thermal Impedance for TO-247



Package Mechanical DATA

