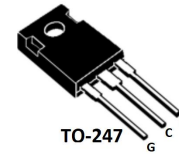


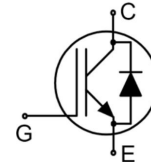
Features

- Low gate charge
- Trench-Stop Technology
- High speed switching
- Saturation voltage: $V_{CE(sat), typ} = 1.5V @ I_C = 50A$ and $T_C = 25^\circ C$



Applications

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



Absolute Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	MSG60T65HHC0	Unit	
Collector-Emmitter Voltage	V_{ces}	650	V	
Collector Current-continuous	I_C	$T = 25^\circ C$	120	A
		$T = 100^\circ C$	60	A
Diode Forward current, limited by T_{jmax}	I_F	$T = 25^\circ C$	120	A
		$T = 100^\circ C$	60	A
Collector Current-pulse(note 1)	I_{CM}	240	A	
Continuous Gate-Emmitter Voltage	V_{GE}	± 20	V	
Transient Gate-emitter voltage	V_{GE}	± 30	V	
Turn-off safe area	-	200	A	
Power Dissipation	P_D	$T_C = 25^\circ C$	260	W
Operating Temperature Range	T_J	-55~175	$^\circ C$	
Storage Temperature Range	T_{STG}	-55~175	$^\circ C$	
Maximum Lead Temperature for Soldering Purposes	T_L	300	$^\circ C$	

Thermal Characteristic

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emmitter Voltage	BV_{CES}	$I_C = 250\mu A, V_{GE} = 0V$	650	-	-	V
		$I_C = 1mA, V_{GE} = 0V$	650			V

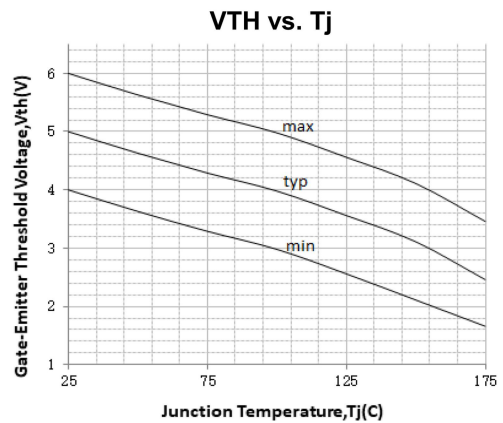
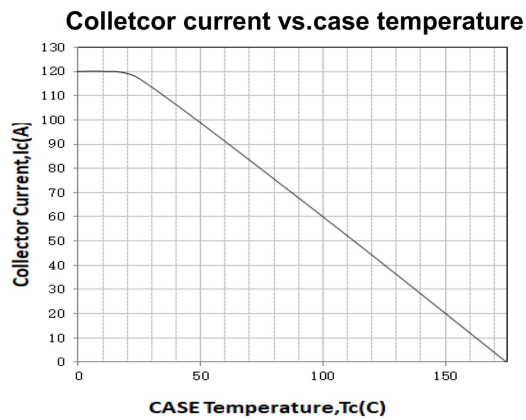
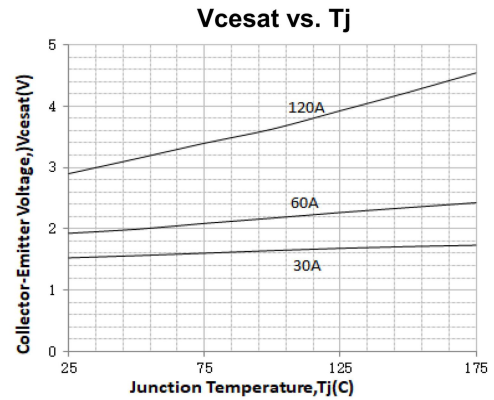
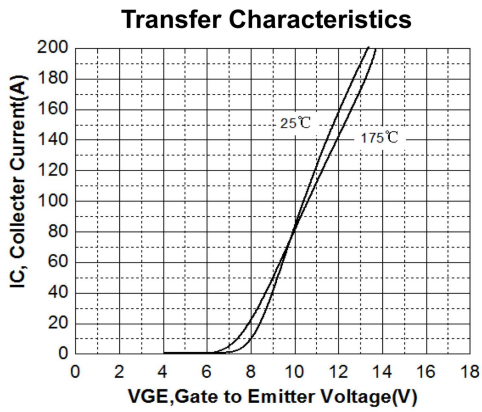
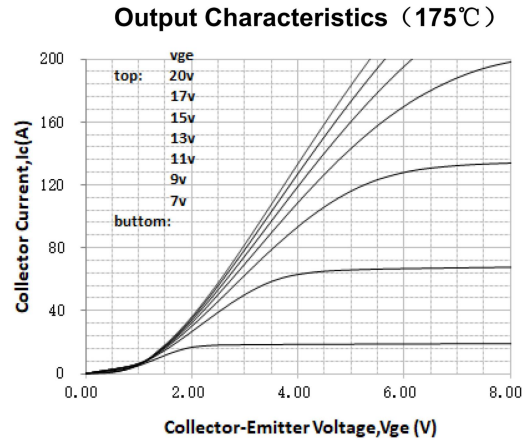
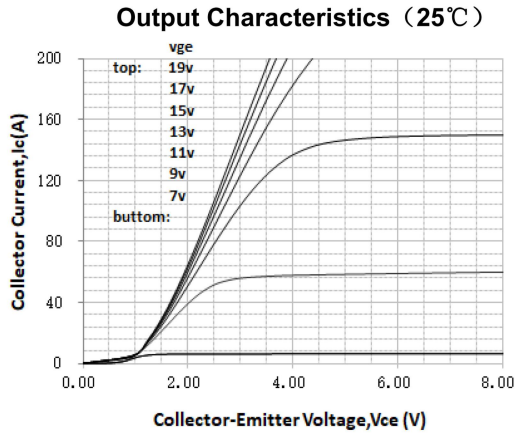
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V,$ $T_C=25^\circ C$	-	0.1	40	μA
		$T_C=150^\circ C$	-	2.25	-	μA
Gate-body leakage current	I_{GESF}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	200	nA
On-Characteristics						
Gate-Emmitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE},$ $I_C=250\mu A$	3.0	5.0	6.0	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=50A$	-	1.5	-	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1.0MHz$	-	3510	-	pF
Output capacitance	C_{oes}		-	244	-	pF
Reverse transfer capacitance	C_{res}		-	81	-	pF
Switching Characteristics						
Turn-On delay time	$t_d(on)$	$V_{CC}=400V, I_C=60A,$ $R_G=10\Omega,$ $V_{GE}=0.0/15.0V$ $T_C=25^\circ C$ Inductive Load	-	36	-	ns
Turn-On rise time	t_r		-	96	-	ns
Turn-off delay time	$t_d(off)$		-	101	-	ns
Turn-off Fall time	t_f		-	55	-	ns
Turn-on energy	E_{on}		-	1.65	-	mJ
Turn-off energy	E_{off}		-	1.1	-	mJ
Total switching Energy	E_{total}	-	2.75	-	mJ	
Turn-On delay time	$t_d(on)$	$V_{CC}=400V, I_C=60A,$ $R_G=10\Omega,$ $V_{GE}=0.0/15.0V$ $T_C=75^\circ C$ Inductive Load	-	33	-	ns
Turn-On rise time	t_r		-	108	-	ns
Turn-off delay time	$t_d(off)$		-	130	-	ns
Turn-off Fall time	t_f		-	105	-	ns
Turn-on energy	E_{on}		-	1.9	-	mJ
Turn-off energy	E_{off}		-	1.5	-	mJ
Total switching Energy	E_{total}	-	3.4	-	mJ	
Total Gate Charge	Q_g	$V_{CE}=480V, I_C=60A,$ $V_{GE}=15V$	-	132	-	nC
Gate to emitter Charge	Q_{ge}		-	33	-	nC
Gate to Collector charge	Q_{gc}		-	55	-	nC

Anti-Paraller Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	VF	$V_{GE}=0V, I_F=30A$	-	-	1.4	V
Diode Forward Current	IF	$T_C=100^{\circ}C$	-	-	60	A
Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=300V$	-	90	-	ns
Reverse recovery charge	Q_{rr}	$I_F=40A$ $di/dt=600/us$ (note 4)	-	900	-	nC
Reverse Recovery Current	Irr		-	17	-	A

Thermal Characteristic

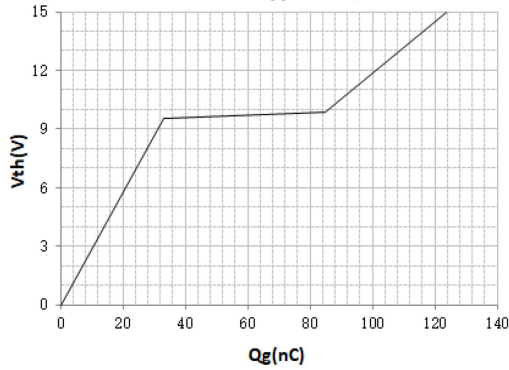
Parameter	Symbol	Max	Unit
IGBT Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.48	$^{\circ}C/W$
Diode Thermal Resistance, Junction to Case	$R_{th(j-c)}$	1.1	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^{\circ}C/W$

Electrical Characteristics (curves)



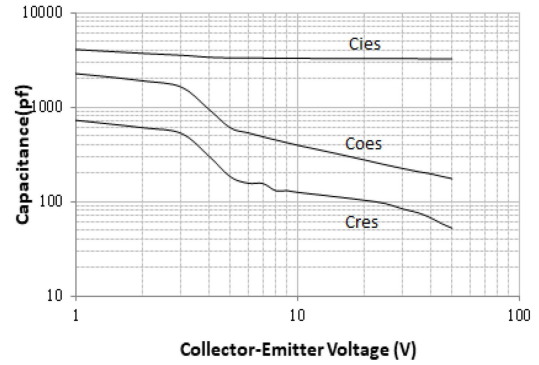
Gate Charge Characteristics

VGE=15V, VCC=480V, IC=60A



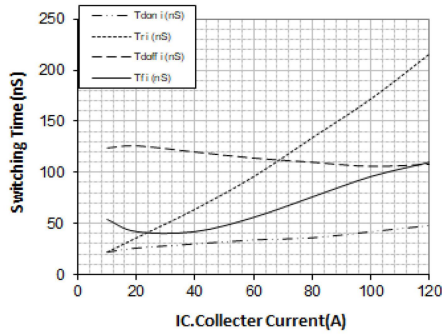
Capacitance Characteristic

VGE = 0V, f=1.0MHZ



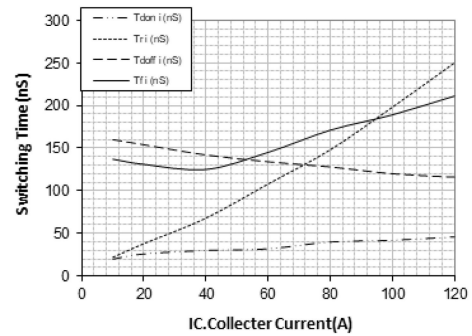
Switching Time vs. IC(25°C)

VCE=400V, VGE=15V, RG=10Ω



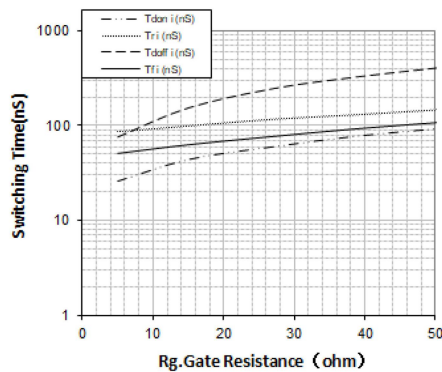
Switching Time vs. IC(175°C)

VCE=400V, VGE=15V, RG=10Ω



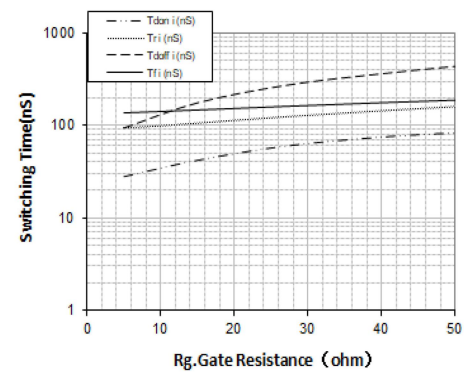
Switching Time vs. Rg(25°C)

VGE=15V, VCE=400V, IC=60A



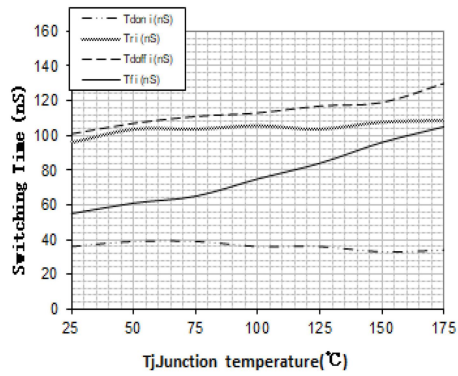
Switching Time vs. Rg(175°C)

VGE=15V, VCE=400V, IC=60A



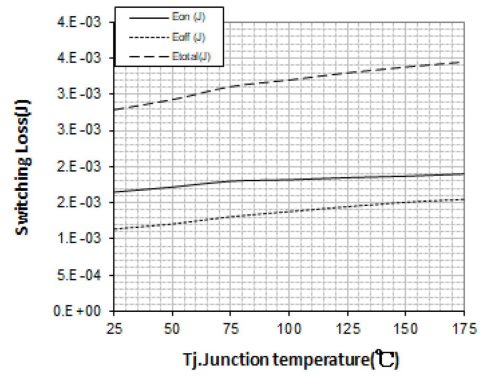
Switching Time vs. Tj

VGE=15V, VCE=400V, IC=60A, Rg=10Ω



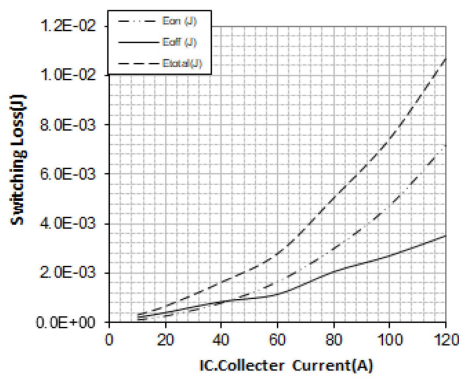
Switching Loss vs. Tj

VGE=15V, VCE=400V, IC=60A, Rg=10Ω



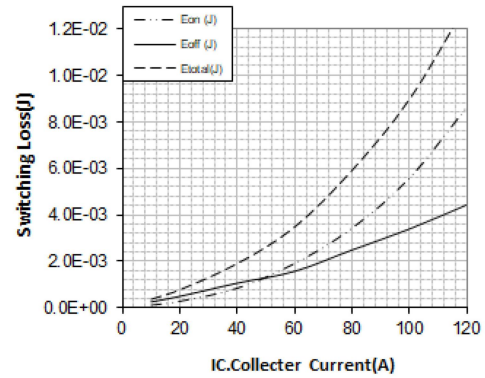
Switching Loss vs. IC(25°C)

VGE=15V, VCE=400V, Rg=10Ω



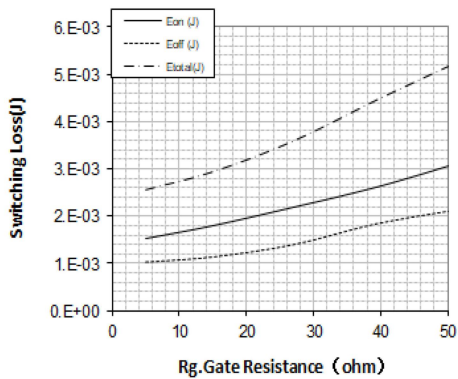
Switching Loss vs. IC(175°C)

VGE=15V, VCE=400V, Rg=10Ω



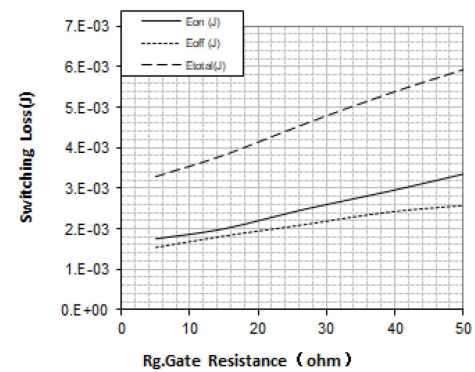
Switching Loss vs. Rg(25°C)

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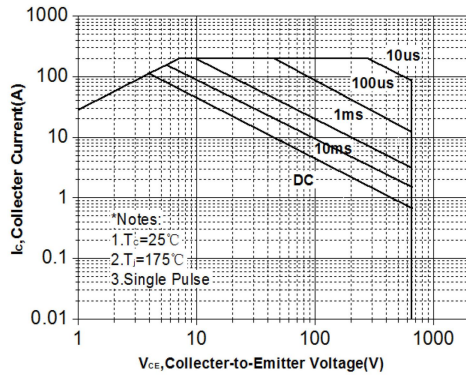


Switching Loss vs. Rg(175°C)

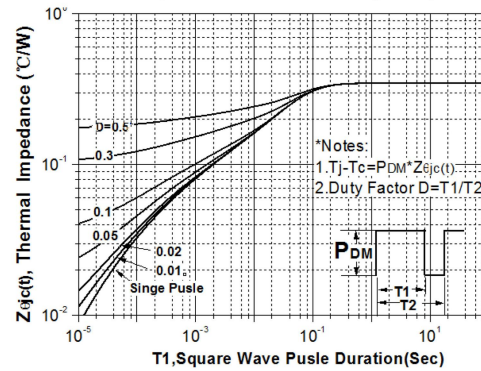
VGE=15V, VCE=400V, IC=60A



Forward Bias SOA



Normalized Maximum Transient Thermal Impedance for IGBT(RJC)



Package Mechanical DATA

