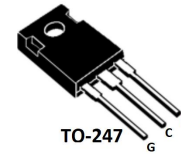


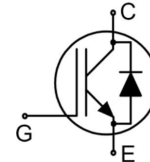
Features

- 650V 60A, $V_{CE(sat)}(typ.)=2.3V@60A$
- Field Stop IGBT Technology.
- 10 μ s Short Circuit Capability.
- Square RBSOA
- Positive $V_{CE(on)}$ Temperature Coefficient,



Applications

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



Absolute Ratings (T_c=25°C)

Parameter	Symbol		Value	Unit
Collector-Emitter Voltage	Vces		650	V
Continuous Gate-Emitter Voltage	V _{GE}		±20	V
Transient Gate-emitter voltage	V _{GE}		±30	V
Collector Current-continuous	Ic	T _C =25℃	120	A
		T _C =100℃	60	A
Collector Current-pulse(note 1)	I _{CM}		240	A
Diode Forward current, limited by T _{jmax}	I _F	T _C =25℃	120	A
		T _C =100℃	60	A
Diode Maximum Forward Current (note 1)	I _{FM}		240	A
Short Circuit withstand time	t _{sc}		10	μs
Short Circuit Current	I _{SC}		270	A
Power Dissipation	P _D	T _C =25℃	500	W
		T _C =100℃	250	W
Operating Temperature Range	T _J		-40~175	℃
Storage Temperature Range	T _{STG}		-55~150	℃
Maximum Lead Temperature for Soldering Purposes	T _L		300	℃

Electrical Characteristics($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	650	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_C=25^{\circ}C$	-	0.1	40	μA
Gate-body leakage current	I_{GESF}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	200	nA
On-Characteristics						
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	4.0	-	5.5	V
Collector-Emitter saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=60A$	-	2.3	-	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	2020	-	pF
Output capacitance	C_{oes}		-	280	-	pF
Reverse transfer capacitance	C_{res}		-	130	-	pF
Integrated gate resistor	R_{Gint}	$f=1MHz; V_{pp}=1V$		1.55		Ω
Switching Characteristics						
Turn-On delay time	$t_d(on)$	$V_{CC}=400V, I_C=60A, R_G=10\Omega, V_{GE}=15V, T_C=25^{\circ}C$ Inductive Load	-	33	-	ns
Turn-On rise time	t_r		-	117	-	ns
Turn-off delay time	$t_d(off)$		-	189	-	ns
Turn-off Fall time	t_f		-	75	-	ns
Turn-on energy	E_{on}		-	2.9	-	mJ
Turn-off energy	E_{off}		-	1.7	-	mJ
Total switching Energy	E_{total}		-	4.6	-	mJ
Total Gate Charge	Q_g	$V_{CE}=480V, I_C=60A, V_{GE}=15V$	-	210	-	nC
Gate to emitter Charge	Q_{ge}		-	28	-	nC
Gate to Collector charge	Q_{gc}		-	115	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						

Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=60A$	-	1.35	-	V
Diode Forward Current	I_F	$T_C=100^{\circ}C$	-	-	60	A
Diode Reverse recovery time	t_{rr}	$V_{GE}=0V,$ $V_R=400V$ $I_F=60A$ $dI_F/dt=600/\mu s$	-	100	-	ns
Reverse recovery charge	Q_{rr}		-	630	-	nC
Reverse Recovery Current	I_{rr}		-	15	-	A

Thermal Characteristic

Parameter	Symbol	Max	Unit
IGBT Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.30	$^{\circ}C/W$
Diode Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.65	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	80	$^{\circ}C/W$

Notes:

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

Order information

Order codes	package	packaging
MSG60T65QHC0	TO-247	Tube

Electrical Characteristics(curves)

Fig 1. DC Collector current as a function of case temperature ($V_{GE} \geq 15V$, $T_J \leq 150^{\circ}C$)

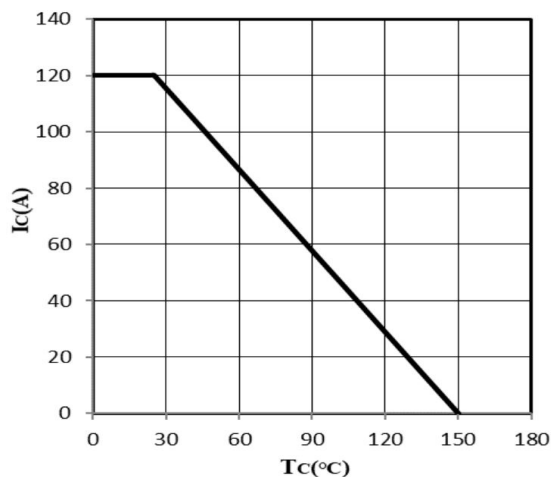


Fig 2. Power dissipation as a function of case temperature ($T_J \leq 150^{\circ}C$)

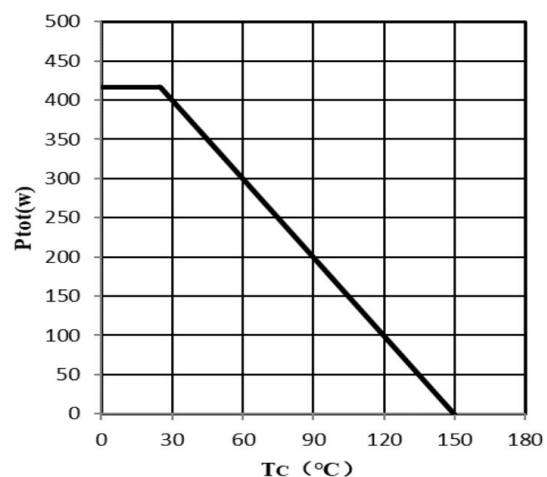


Fig 3. IGBT Forward safe operation area

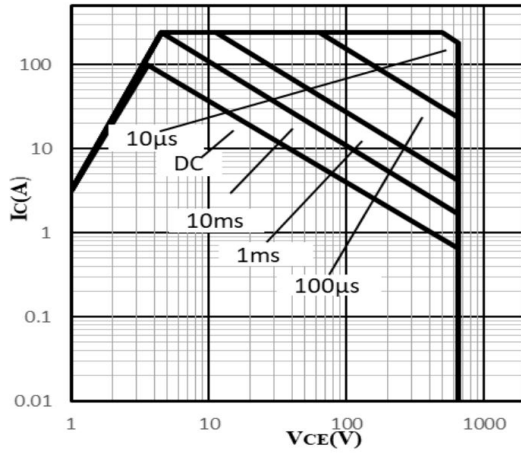


Fig 4. IGBT Reverse safe operation area

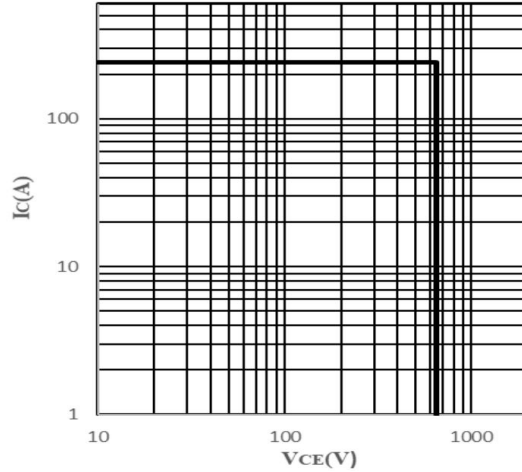


Fig 5. Typical output characteristic ($T_j=25^\circ\text{C}$)

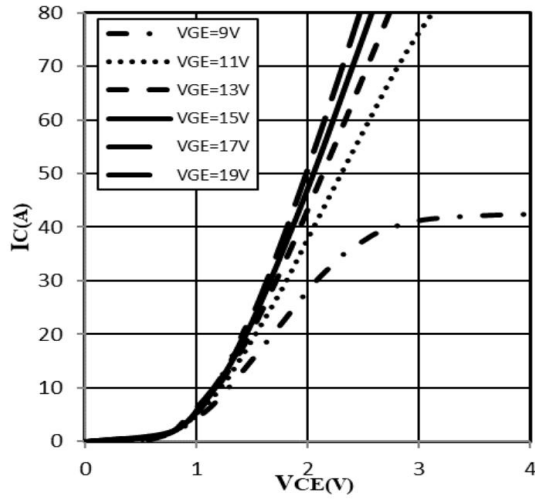


Fig 6. Typical output characteristic ($T_j=125^\circ\text{C}$)

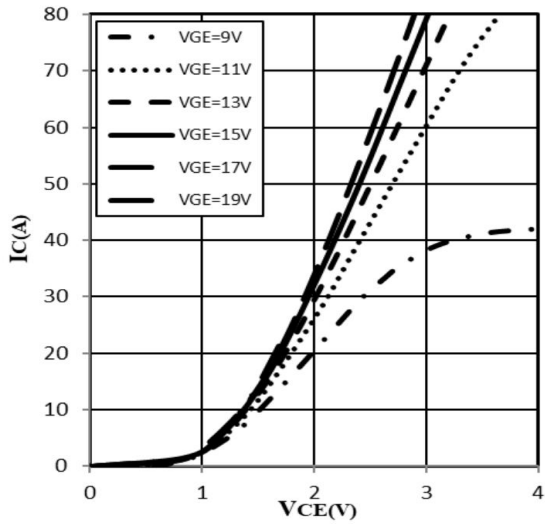


Fig 7. Typical transfer characteristic ($V_{CE}=20\text{V}$)

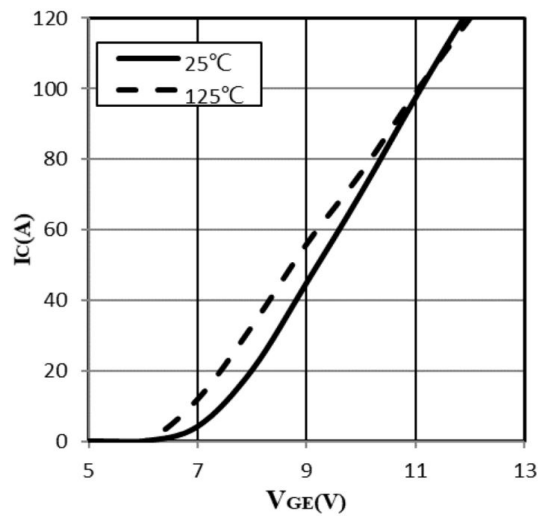


Fig 8. Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)

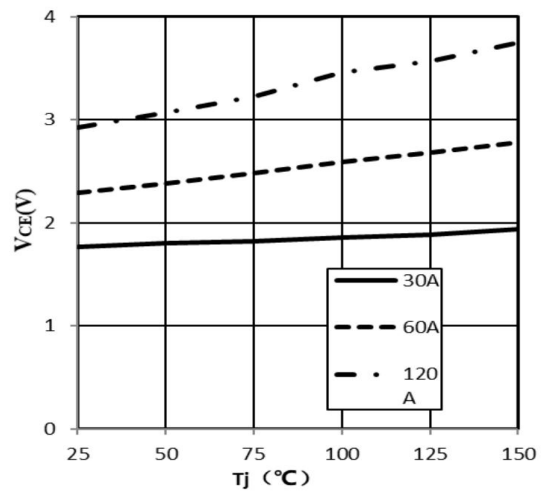


Fig 9. Typical collector-emitter saturation voltage as a function of V_{GE} ($T_j=25^\circ\text{C}$)

Fig 10. Typical collector-emitter saturation voltage as a function of V_{GE} ($T_j=125^\circ\text{C}$)

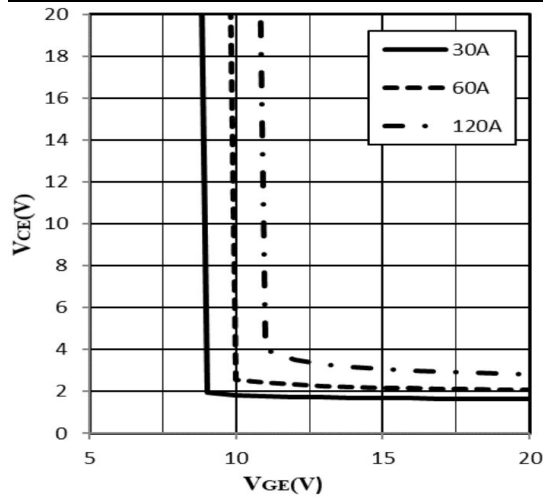


Fig 11. Typical switch energy as a function of I_c
(inductive load, $T_j=25^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_G=10\Omega$)

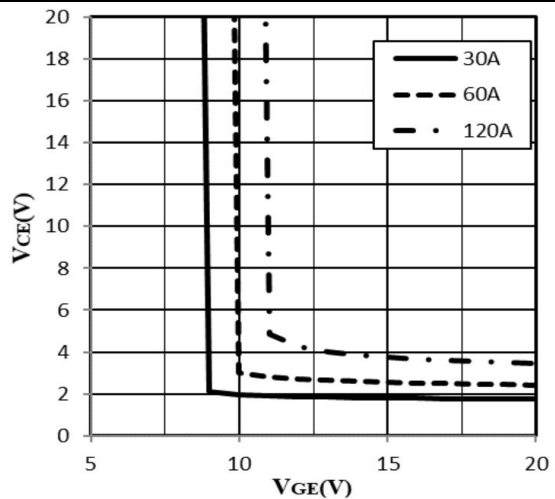


Fig 12. Typical switch time as a function of I_c
(inductive load, $T_j=25^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_G=10\Omega$)

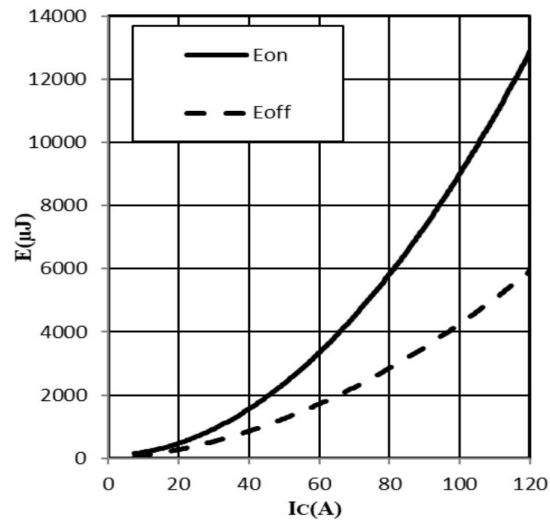


Fig 13. Typical switch energy as a function of R_G
(inductive load, $T_j=25^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $I_c=60\text{A}$)

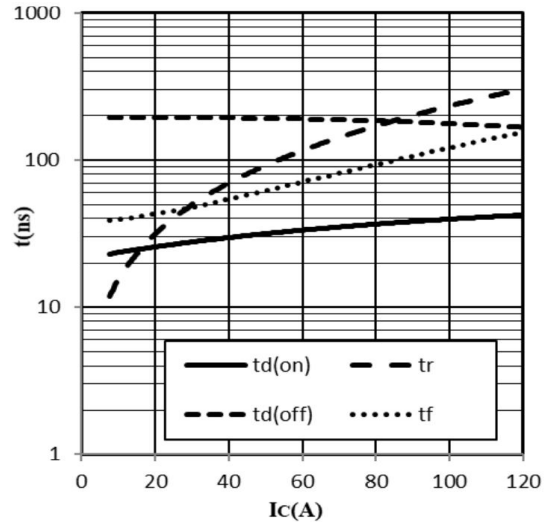


Fig 14. Typical switch time as a function of R_G
(inductive load, $T_j=25^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $I_c=60\text{A}$)

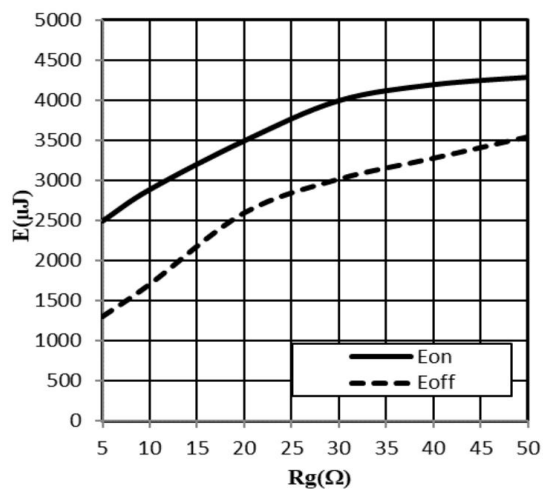


Fig 15. Typical capacitance as a function of collector-emitter voltage ($V_{GE}=0\text{V}$, $f=1\text{MHz}$)

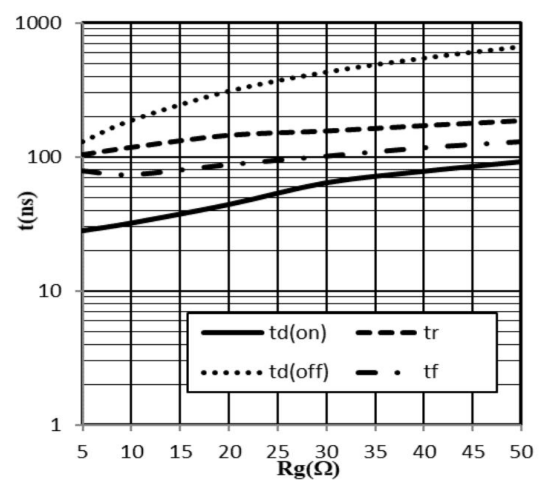


Fig 16. Typical gate charge ($I_c=60\text{A}$)

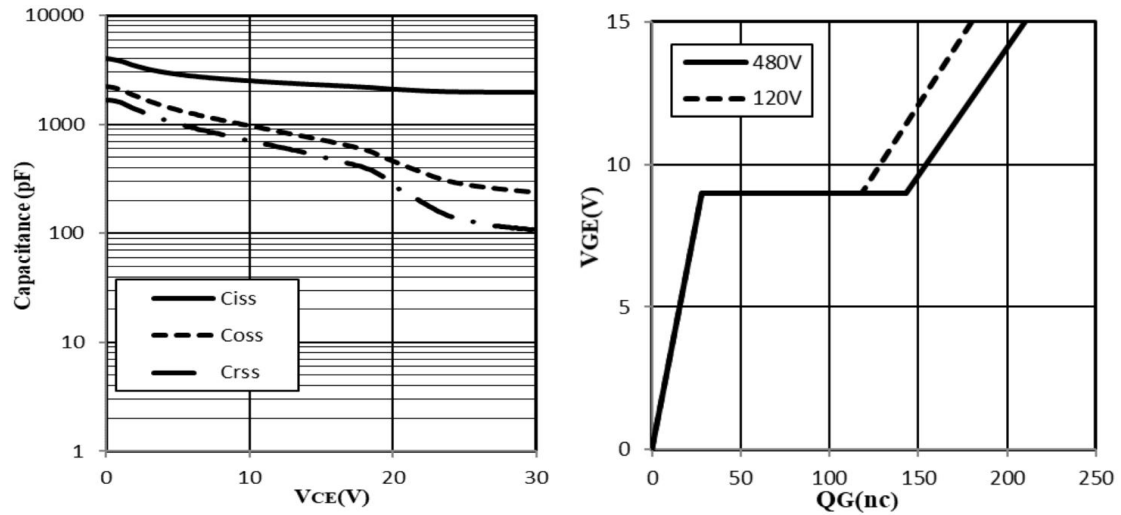
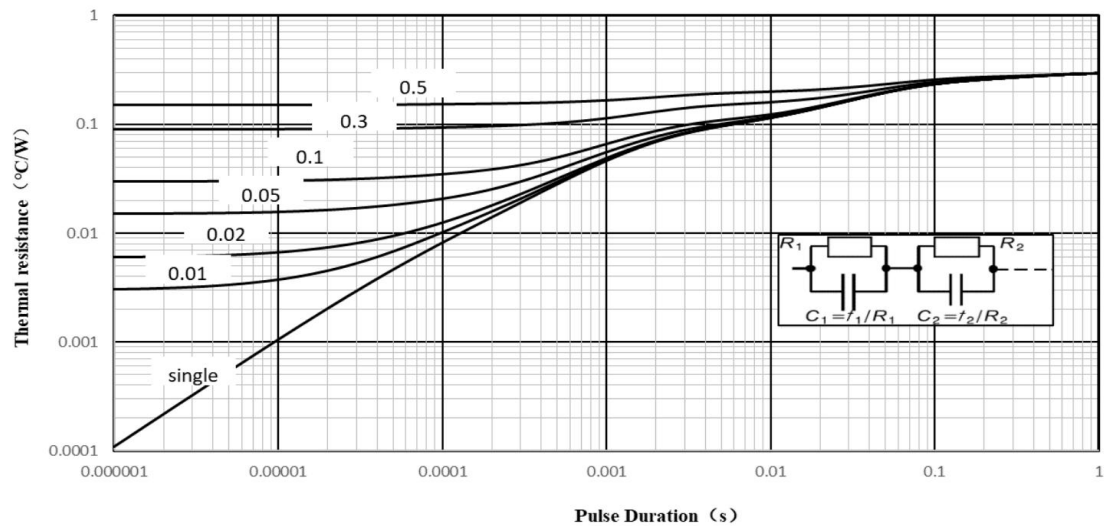


Fig 18. IGBT transient thermal resistance($D=tp/T$)



Package Mechanical DATA

