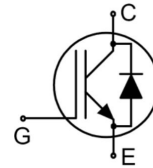
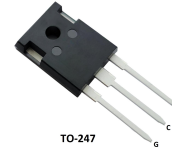
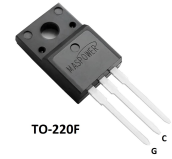


### Features

- Low gate charge
- Trench FS Technology
- Fast switching speed
- Low switching losses



### Applications

- PFC
- UPS
- Inverter
- Welding Machine

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	
Collector-emitter voltage	$V_{CES}$	650	V	
Gate-emitter voltage	$V_{GES}$	$\pm 30$		
Collector current*	$I_C$	$T_C=25^\circ\text{C}$	60	
		$T_C=100^\circ\text{C}$	30	
Pulsed collector current, pulse time limited by $T_{jmax}$ (note1)	$I_{CM}$	120	A	
Diode forward current	$I_F$	$T_C=25^\circ\text{C}$		60
		$T_C=100^\circ\text{C}$		30
Diode pulsed current, Pulse time limited by $T_{jmax}$	$I_{FM}$	120		
Power dissipation(TO-220F)	$P_D$	35	W	
Power dissipation(TO-247)	$P_D$	230	W	
Operating Junction and storage temperature rang(note2)	$T_J$	-55 to 175	$^\circ\text{C}$	
	$T_{stg}$	-55 to 175		

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Collector-emitter breakdown voltag	$BV_{CES}$	$I_C = 500\mu\text{A}, V_{GE} = 0\text{V}$	650	-	-	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 250\mu\text{A}$	3.5	4.5	5.5	
Zero gate voltage collector current	$I_{CES}$	$V_{CE} = 650\text{V}, V_{GE} = 0\text{V}$	-	-	50	$\mu\text{A}$
Gate-emitter leakage current	$I_{GES}$	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$	-	-	$\pm 200$	nA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 30\text{A}, V_{GE} = 15\text{V}, T_C = 25^\circ\text{C}$	-	1.7	-	V
<b>Dynamic and Switching Characteristi</b>						

Total gate charg	$Q_g$	$V_{CE} = 520V, I_C = 30A,$ $V_{GE} = 15V$	-	62	-	nC
Gate emitter charge	$Q_{ge}$		-	9.5	-	nC
Gate Collector Charge	$Q_{gc}$		-	33	-	nC
Input capacitanc	$C_{ies}$	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz$	-	955	-	pF
Reverse transfer capacitanc	$C_{res}$		-	107	-	
Output capacitance	$C_{oes}$		-	33	-	
Turn-on delay time	$t_{d(on)}$	$V_{GE} = 15V, V_{CC} = 400V,$ $I_C = 30A, R_G = 10\Omega,$ Inductive Load, $T_C = 25^\circ C$	-	11	-	nS
Rise tim	$t_r$		-	42	-	
Turn-off delay time	$t_{d(off)}$		-	89	-	
Fall time	$t_f$		-	73	-	mJ
Turn-on switching energy	$E_{on}$		-	0.53	-	
Turn-off switching energy	$E_{off}$		-	0.55	-	
Total switching energ	$E_{ts}$	-	1.0	-		
Turn-on delay time	$t_{d(on)}$	$V_{GE} = 15V, V_{CC} = 400V,$ $I_C = 30A, R_G = 10\Omega,$ Inductive Load, $T_C = 150^\circ C$	-	10	-	nS
Rise tim	$t_r$		-	44	-	
Turn-off delay time	$t_{d(off)}$		-	114	-	
Fall time	$t_f$		-	130	-	mJ
Turn-on switching energy	$E_{on}$		-	0.52	-	
Turn-off switching energ	$E_{off}$		-	0.79	-	
Total switching energ	$E_{ts}$	-	1.30	-		
<b>Diode Characteristics (Tc =25°C unless otherwise specified)</b>						
Forward voltag	$V_F$	$I_F=20A, T_C=25^\circ C$	-	1.4	-	V
Reverse recovery time	$t_{rr}$	$I_F=30A, di/dt=200A/\mu S$ $T_C=25^\circ C$	-	50	-	nS
Reverse recovery current	$I_{rr}$		-	2.5	-	A
Reverse recovery charge	$Q_{rr}$		-	0.31	-	uC

## Thermal Characteristics

Parameter	Symbol	Value		Unit
Thermal resistance junction-to-ambien	$R_{\theta JA}$	62.5		°C/W
Thermal resistance junction-to-case for IGBT	$R_{\theta JC}$	3.57	0.65	
Thermal resistance junction-to-case for Diode	$R_{\theta JC}$	7.7	40	

\*Collector current limited by maximum junction temperature.

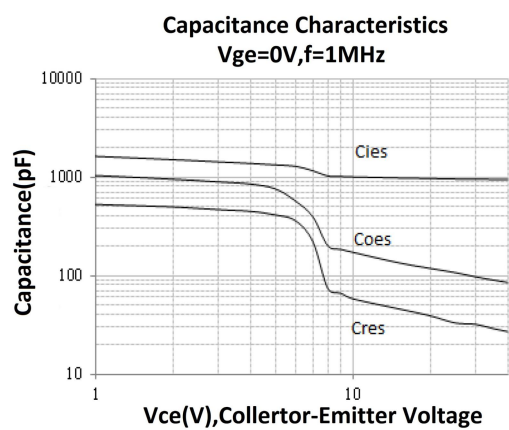
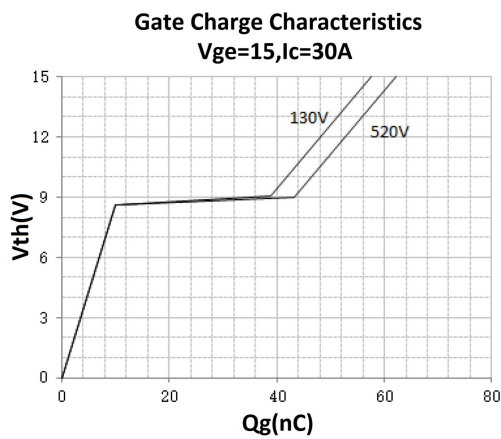
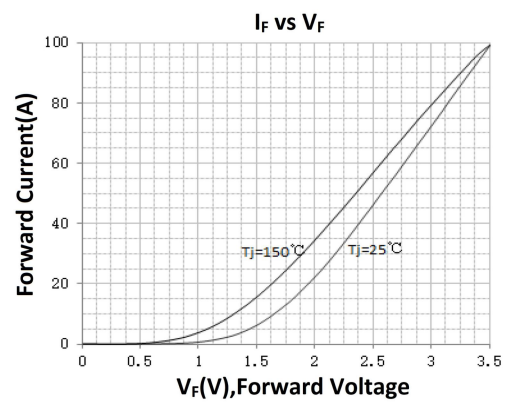
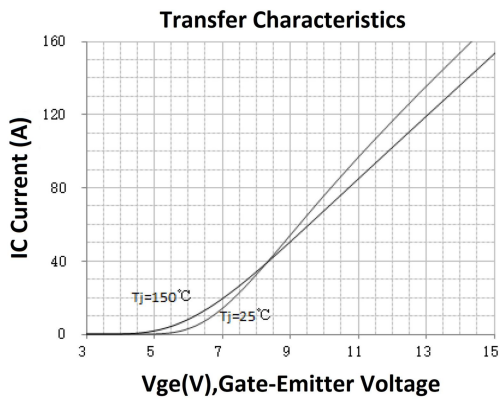
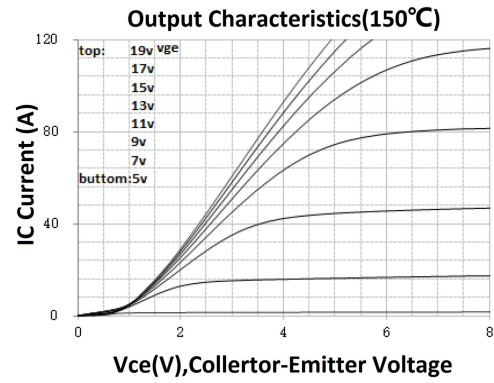
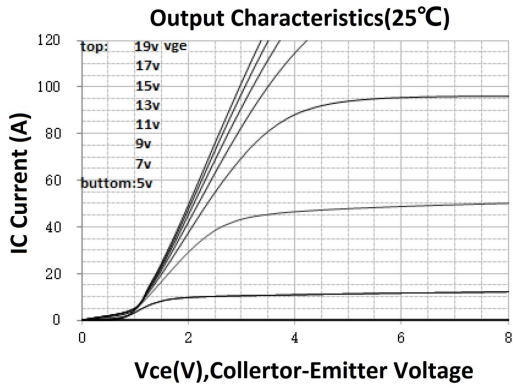
1: Pulse width limited by maximum junction temperature.

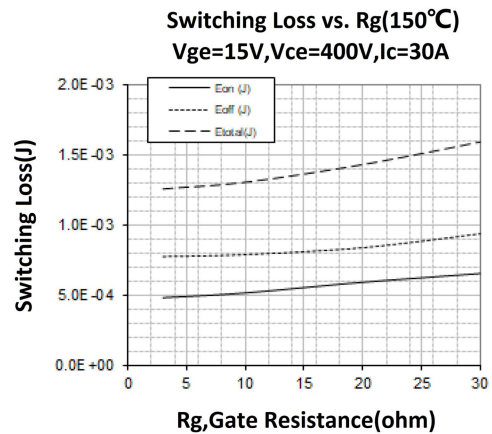
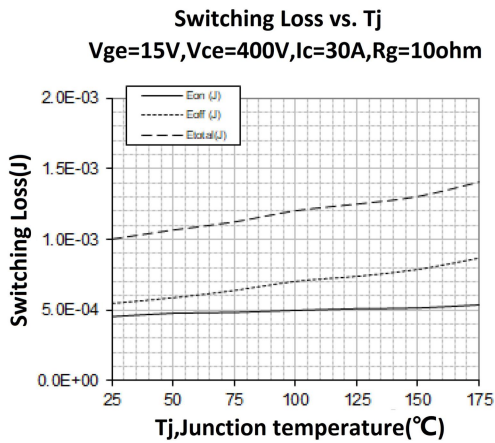
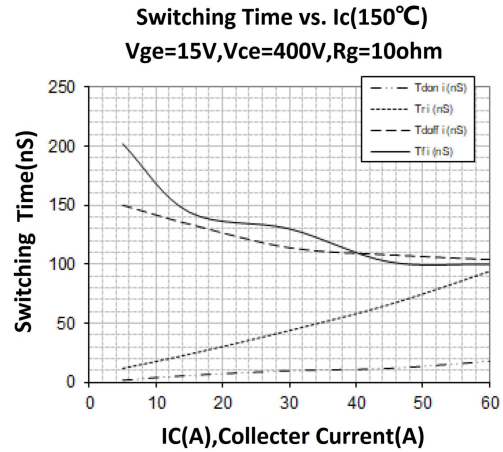
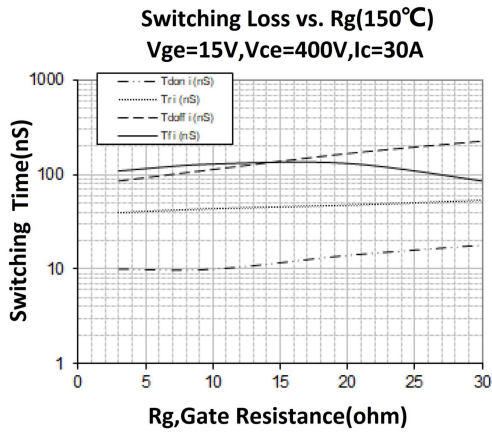
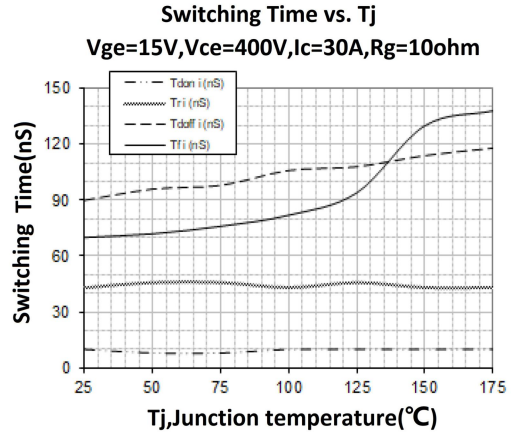
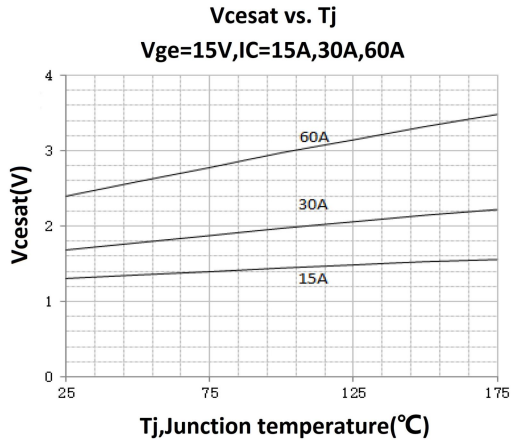
2: Under overload condition, it is allowed to operate at the maximum junction temperature  $T_{vjop}=175^\circ C$ , and the maximum duty ratio is less than 20% (lasting for 60 s at most)

## Order Message

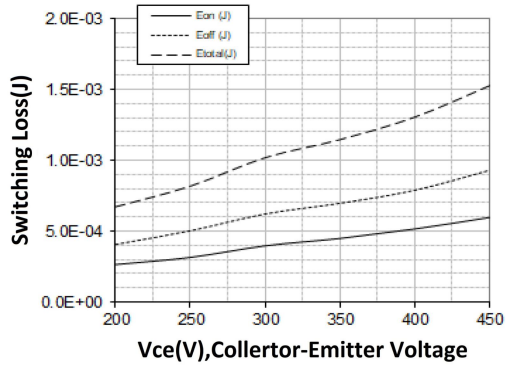
Order codes	Package	Packaging
MSG30T65HHT1	TO-220F	Tube
MSG30T65HHC0	TO-247	Tube

### Typical Performance Characteristic

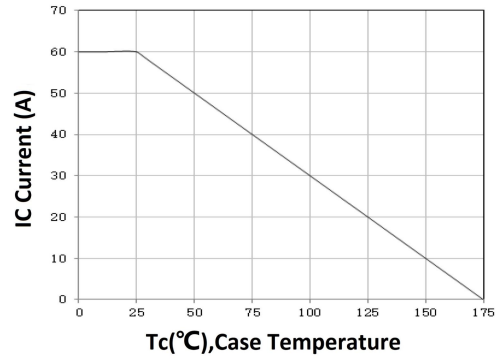




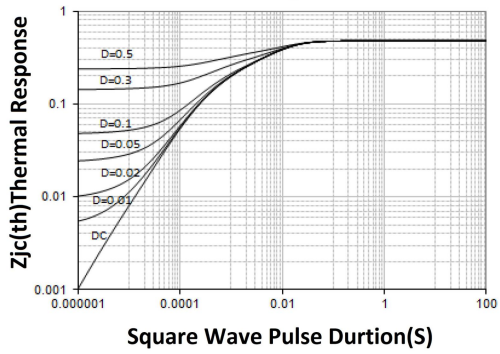
**Switching Loss vs. Vce(150°C)**  
**Vge=15V, Ic=30A, Rg=10ohm**



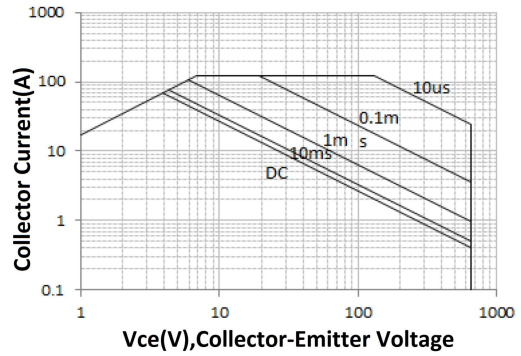
**Collector current vs. case temperature**



**Transient Thermal Impedance for IGBT**



**Forward Bias Safe Operating Area**



Package outline dimension

