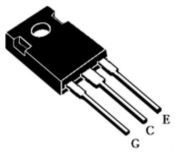
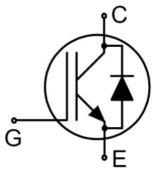
Features

- Fast Switching & Low $V_{CE[sat]}$
- High Input Impedance
- VCE(sat) = 1.88V @ IC = 40A
- High Input Impedance
- Short circuit withstand time 10 μs



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}	±20	
Collector curre	T_C=25°C	I_C	80	A
	T_C=100°C		40	
Pulsed collector current, pulse time limited by Tjmax		I_{CM}	120	
Diode forward current @ T_C = 100°C		I_F	20	
Diode pulsed current, Pulse time limited by Tjmax		I_{FM}	60	
Power dissipati	T_C=25°C	P_D	280	W
	T_C=100°C		120	
Operating Junction and storage temperature rang		T_J	-55 to175	°C
		T_{stg}	-55 to175	

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	$R_{\theta JC}$	0.75	
Thermal resistance junction-to-case for Diod	$R_{\theta JC}$	1.8	

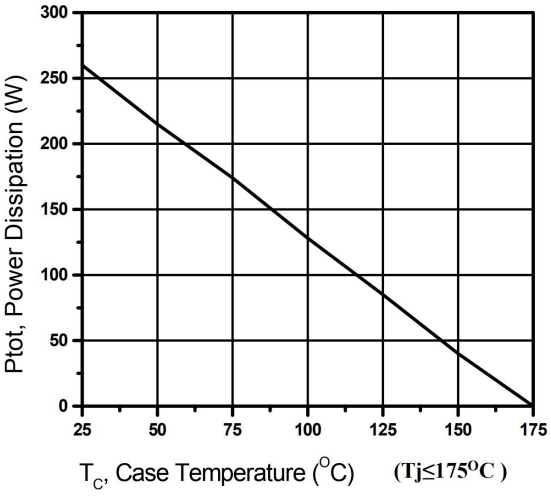
① These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heat sink, assuming maximum junction temperature of $T_{J(MAX)}$=175°C.

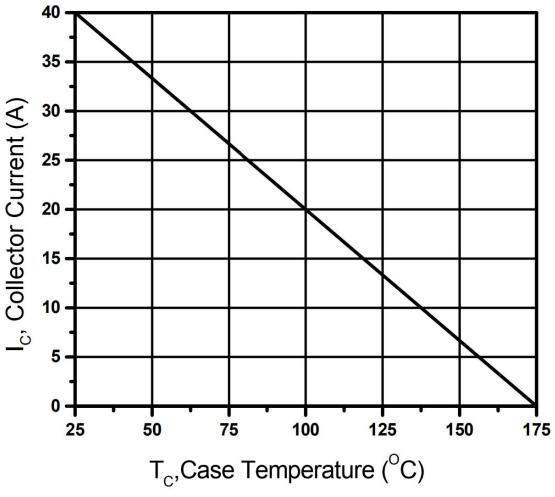
② The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

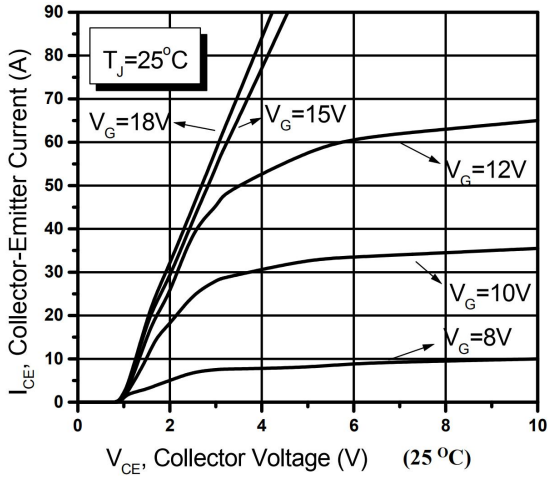
Electrical Characteristics (Tc =25°C unless otherwise specified)

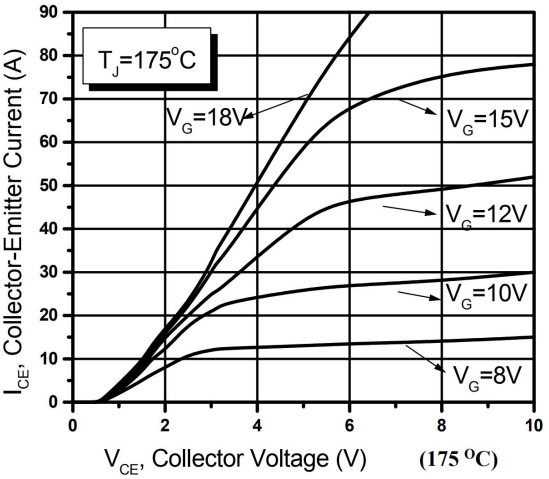
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Collector-emitter breakdown voltag	BV_{CES}	I_C = 500 μ A, V_{GE} = 0V	650	-	-	V
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 250 μ A	4.0	5.7	7	
Zero gate voltage collector current	I_{CES}	V_{CE} = 650V, V_{GE} = 0V	-		1000	μ A
Gate-emitter leakage current	I_{GES}	V_{GE} = 20V, V_{CE} = 0V	-	-	±250	nA
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 40A V_{GE} = 15V T_C = 25°C	-	1.88	2.36	V
		I_C = 40A, V_{GE} = 15V, T_C = 150°C	-	2.4	-	
Dynamic and Switching Characteristi						
Total gate charg	Q_g	V_{CE} = 400V, I_C = 40A, V_{GE} = 15V	-	165	-	nC
Input capacitanc	C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	3155	-	pF
Reverse transfer capacitanc	C_{res}		-	81.5	-	
Output capacitance	C_{oes}		-	175	-	
Turn-on delay time	$t_{d(on)}$	V_{GE} = 15V, V_{CC} = 400V, I_C = 40A, R_G = 10Ω , Inductive Load, T_C = 25°C	-	45	-	nS
Rise tim	t_r		-	50	-	
Turn-off delay time	$t_{d(off)}$		-	210	-	
Fall time	tf		-	55	-	
Turn-on switching energy	E_{on}		-	1.6	-	mJ
Turn-off switching energy	E_{off}		-	0.7	-	
Total switching energ	E_{ts}		-	2.3	-	
Turn-on delay time	$t_{d(on)}$	V_{GE} = 15V, V_{CC} = 400V, I_C = 40A, R_G = 10Ω , Inductive Load, T_C = 125°C	-	75	-	nS
Rise tim	tr		-	80	-	
Turn-off delay time	$t_{d(off)}$		-	305	-	
Fall time	t_f		-	108	-	
Turn-on switching energy	E_{on}		-	2.1	-	mJ
Turn-off switching energ	E_{off}		-	1.4	-	
Total switching energ	E_{ts}		-	1.5	-	
Short circuit safer operation area	SCSOA	T_J=125℃ V_{CE}=300V I_C=40A R_g=22ohm V_{GE}=0-15V	10	-	-	μ S
Diode Characteristics (Tc =25°C unless otherwise specified)						
Forward voltag	V_F	I_F=20A,T_C=25℃	-	1.8	-	V
		I_F=20A,T_C=125℃	-	1.6	-	
Reverse recovery time	t_{rr}	I_F=20A,di/dt=200A/μS T_C=25℃	-	41	-	nS
Reverse recovery current	I_{rr}		-	13.3	-	A
Reverse recovery charge	Q_{rr}		-	310	-	nC

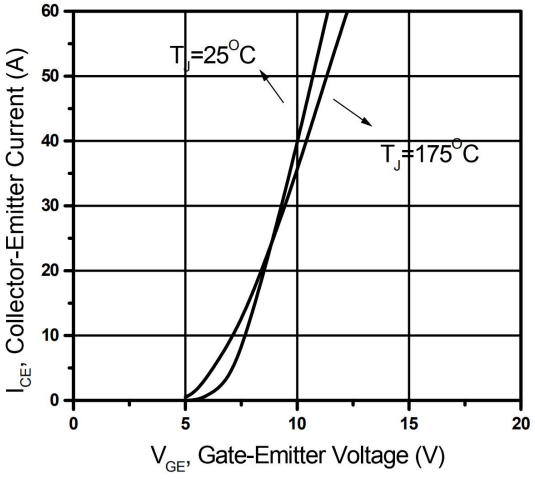
Typical Performance Characteristic

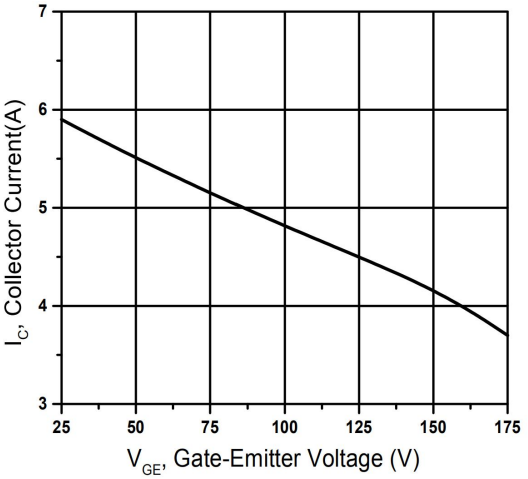

Ptot, Power Dissipation (W)
300
250
200
150
100
50
0
25
50
75
100
125
150
175
T_C, Case Temperature (°C)
(Tj≤175°C)

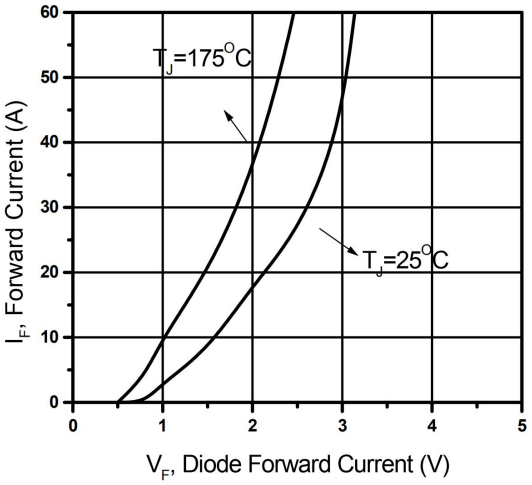

I_C, Collector Current (A)
40
35
30
25
20
15
10
5
0
25
50
75
100
125
150
175
T_C,Case Temperature (°C)

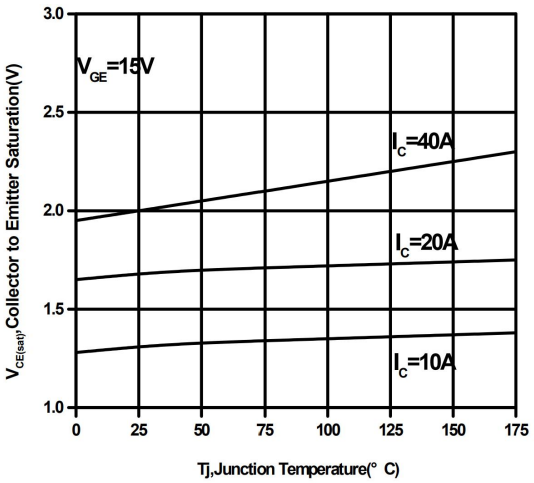

I_CE, Collector-Emitter Current (A)
T_J=25°C
V_G=18V
V_G=15V
V_G=12V
V_G=10V
V_G=8V
90
80
70
60
50
40
30
20
10
0
0
2
4
6
8
10
V_CE, Collector Voltage (V)
(25 °C)

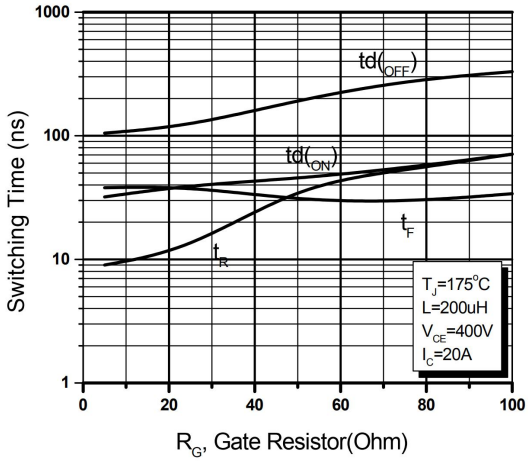

I_CE, Collector-Emitter Current (A)
T_J=175°C
V_G=18V
V_G=15V
V_G=12V
V_G=10V
V_G=8V
90
80
70
60
50
40
30
20
10
0
0
2
4
6
8
10
V_CE, Collector Voltage (V)
(175 °C)

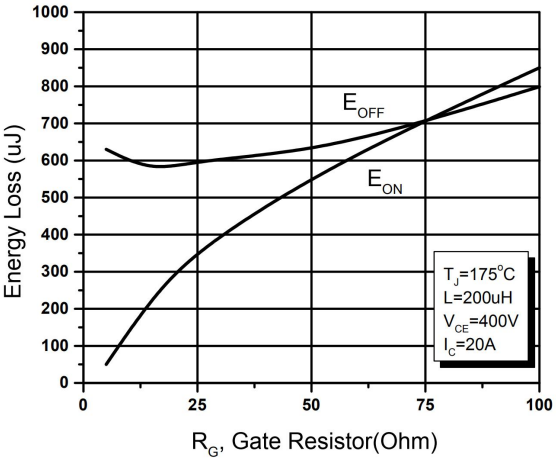

I_CE, Collector-Emitter Current (A)
T_J=25°C
T_J=175°C
60
50
40
30
20
10
0
0
5
10
15
20
V_GE, Gate-Emitter Voltage (V)

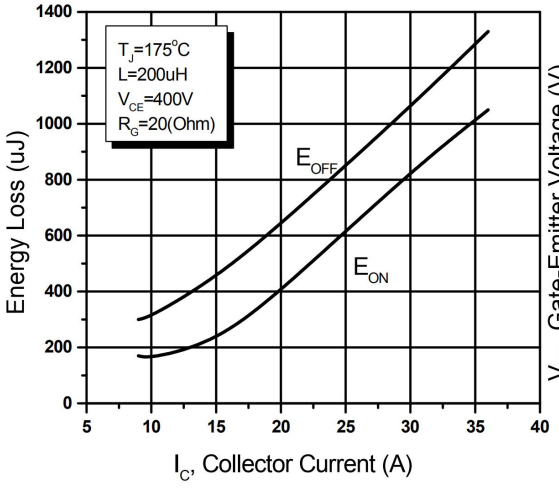

I_C, Collector Current(A)
7
6
5
4
3
25
50
75
100
125
150
175
V_GE, Gate-Emitter Voltage (V)

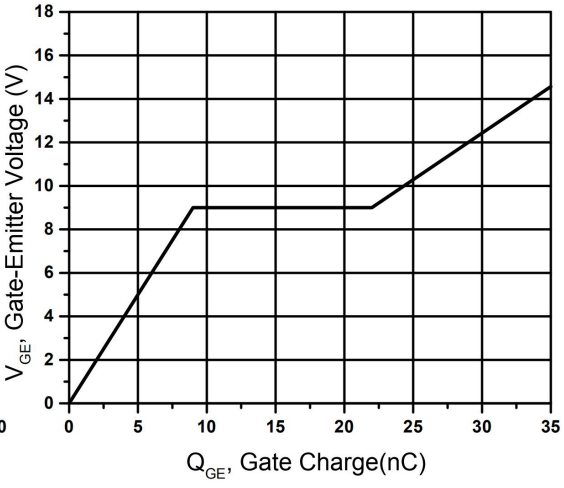

T_J=175°C
T_J=25°C
I_F, Forward Current (A)
V_F, Diode Forward Current (V)

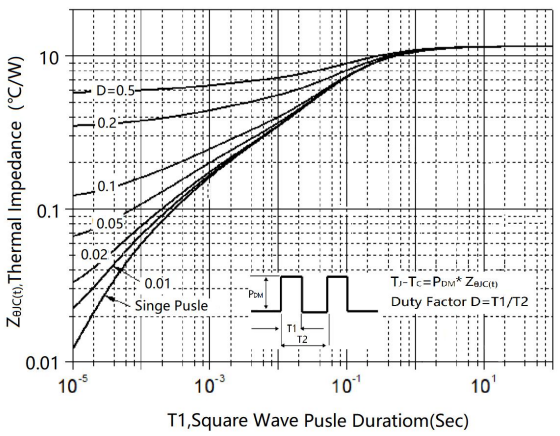

V_{GE}=15V
I_C=40A
I_C=20A
I_C=10A
$V_{CE(sat)}$,Collector to Emitter Saturation(V)
Tj,Junction Temperature(° C)

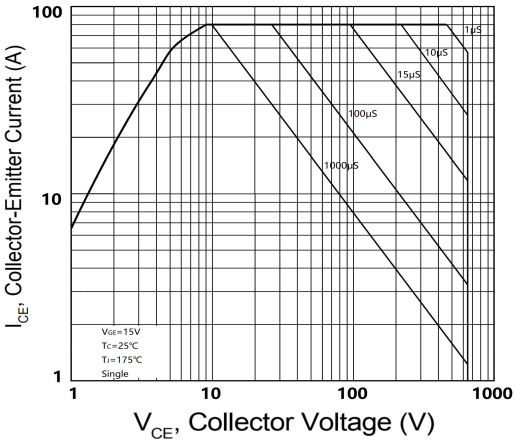

td(OFF)
td(ON)
t_F
t_R
T_J=175°C
L=200uH
V_{CE}=400V
I_C=20A
Switching Time (ns)
R_G, Gate Resistor(Ohm)


E_{OFF}
E_{ON}
T_J=175°C
L=200uH
V_{CE}=400V
I_C=20A
Energy Loss (uJ)
R_G, Gate Resistor(Ohm)


T_J=175°C
L=200uH
V_{CE}=400V
R_G=20(Ohm)
E_{OFF}
E_{ON}
Energy Loss (uJ)
I_C, Collector Current (A)


V_{GE}, Gate-Emitter Voltage (V)
Q_{GE}, Gate Charge(nC)





Package outline dimension