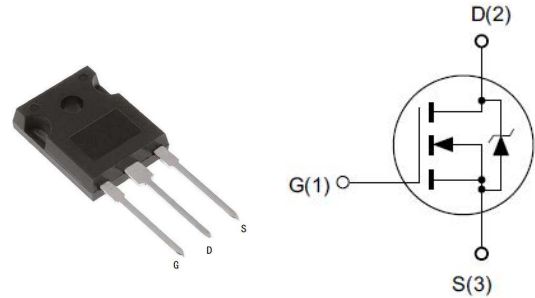


Features

- ◆ 650V, 54A, $R_{DS(ON)}(Typ.) = 55m\Omega @ V_{GS} = 10V$
- ◆ Advanced Super Junction Technology
- ◆ Easy To Control Gate Switching
- ◆ 100% Avalanche Tested



Application

- ◆ LLC Application-Server Power and Telecom Power
- ◆ Phase-shift-bridge (ZVS), EV Charging and Solar inverter
- ◆ Soft Switching Boost PFC switch, Half bridge or Asymmetric half bridge or Series resonance half bridge and full bridge topologies

Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	650	V
V_{GS}	Gate-Source Voltage	± 30	
I_D	Drain Current-Continuous, $T_c = 25^\circ\text{C}$	54	A
I_{DM}	Drain Current-Pulsed ^b	162	
P_D	Maximum Power Dissipation, $T_c = 25^\circ\text{C}$	246	W
dv/dt	Peak Diode Recovery dv/dt ^c	15	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	1620	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.507	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = 30V$	-	-	100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5	-	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 14A$	-	55	68	m Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$f = 1.0MHz$	-	1.037	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 50V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	4406	-	pF
C_{oss}	Output Capacitance		-	267	-	
C_{rss}	Reverse Transfer Capacitance		-	2.3	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400V,$ $V_{GS} = 13V,$ $I_D = 25.8A,$ $R_G = 1.7\Omega$	-	12.6	-	ns
t_r	Turn-On Rise Time		-	3.2	-	
$t_{d(off)}$	Turn-Off Delay Time		-	47.8	-	
t_f	Turn-Off Fall Time		-	6.7	-	
Q_g	Total Gate Charge	$V_{DD} = 400V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 25.8A$	-	93.2	-	nC
Q_{gs}	Gate-Source Charge		-	21.6	-	
Q_{gd}	Gate-Drain Charge		-	32.5	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_F = 1A$	-	0.68	-	V
T_{rr}	Body Diode Reverse Recovery Time	$V_R = 400V, I_F = 25.8A$ $di_F/dt = 100A/\mu s$	-	454	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$V_R = 400V, I_F = 25.8A$ $di/dt = 100A/\mu s$	-	9.361	-	μC
I_{rrm}	Peak reverse recovery current	$V_R = 400V, I_F = 25.8A$ $di/dt = 100A/\mu s$	-	40.64	-	A

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- $L = 10mH, V_{DD} = 100V, I_{AS} = 18A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.

■ Characteristic Curve

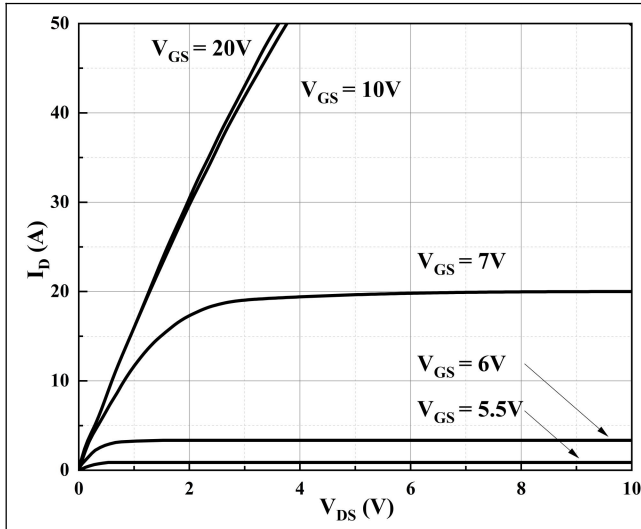


Figure 1. Typical Output Characteristics

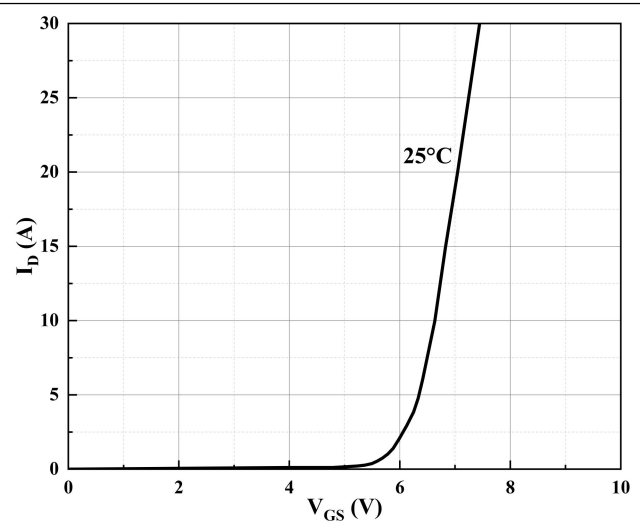


Figure 2. Typical Transfer Characteristics

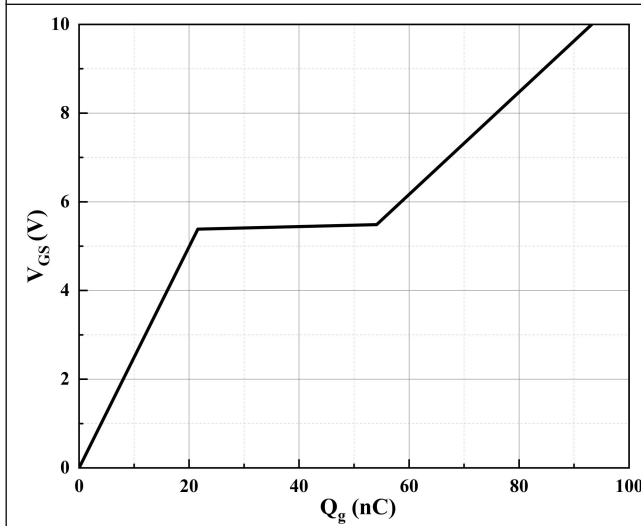


Figure 3. Typical Gate Charge

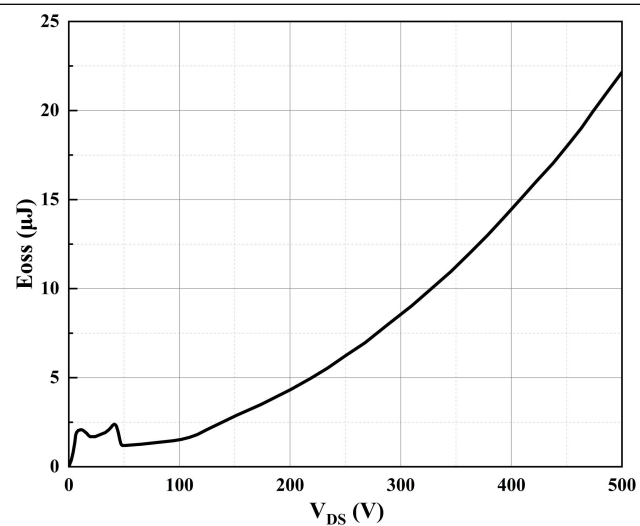


Figure 4. Typical C_{oss} Stored Energy

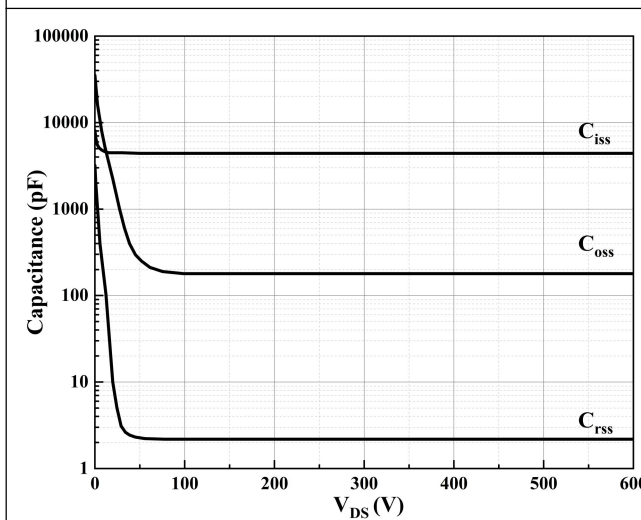


Figure 5. Typical Capacitance

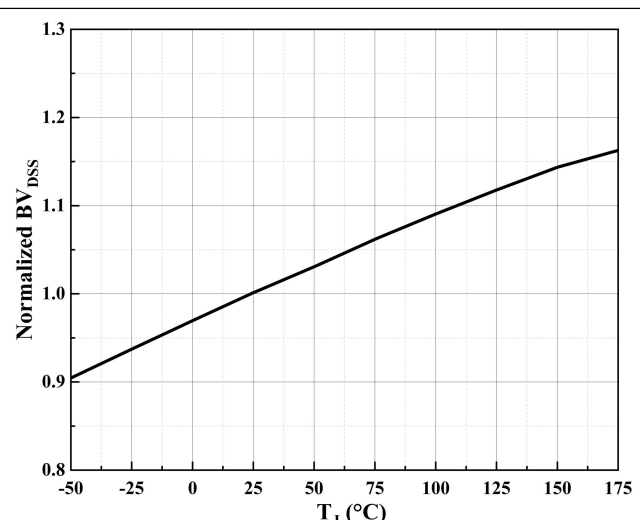


Figure 6. Normalized Breakdown voltage vs. Junction Temperature

■ Characteristic Curve

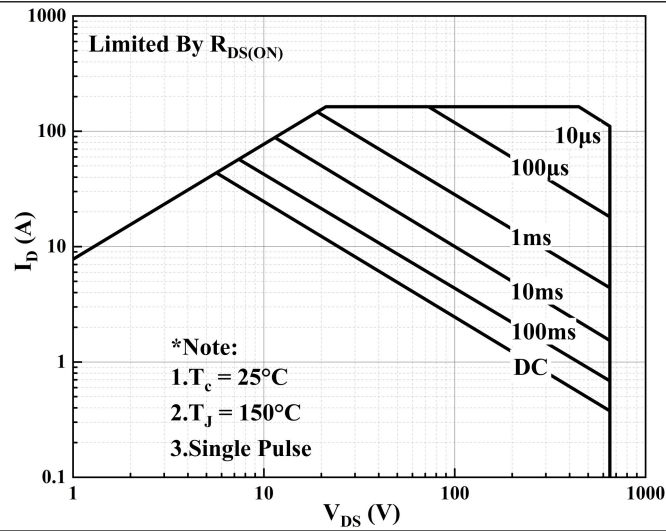
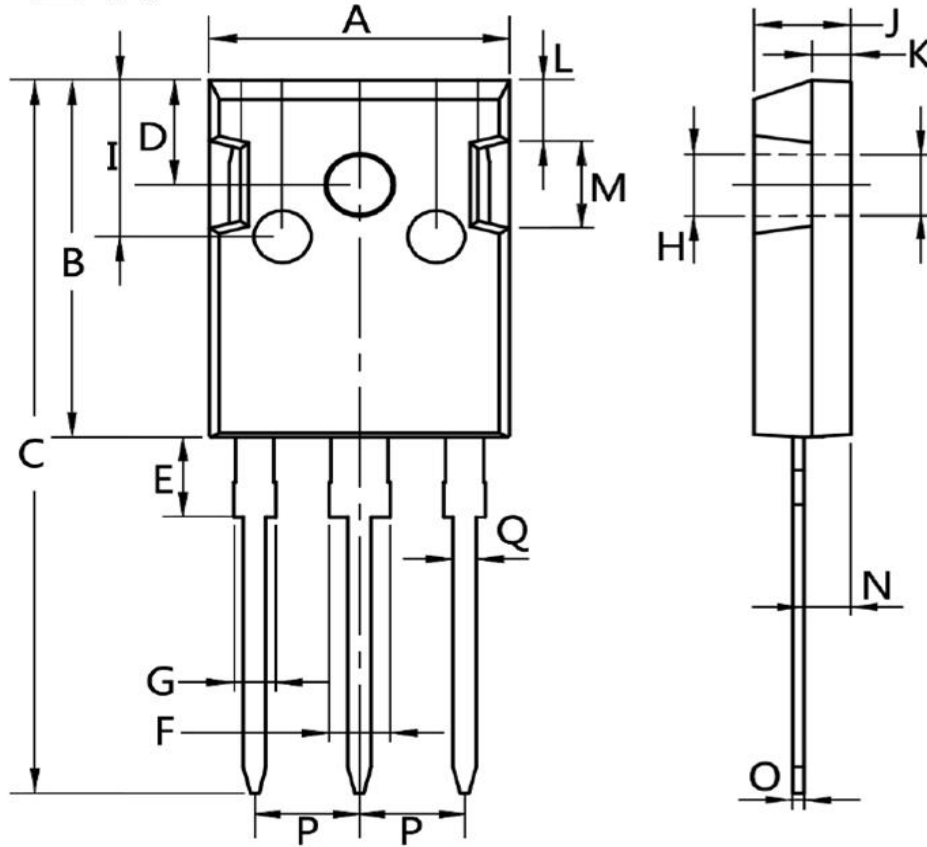


Figure 7. Maximum Safe Operating Area

■ Package Information

TO-247



Dim.	Min.	Max.
A	15.0	16.0
B	20.0	21.0
C	40.0	42.0
D	5.5	6.5
E	4.0	5.5
F	2.5	3.5
G	1.75	2.5
H	3.0	4.0
I	8.0	10.0
J	4.9	5.1
K	1.9	2.1
L	3.0	4.0
M	4.75	5.25
N	2.0	3.0
O	0.55	0.65
P	Typ 5.4	
Q	1.2	1.3
All Dimensions in millimeter		