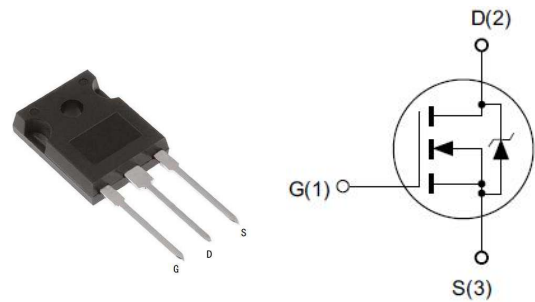


Features

- ◆ 650V, 54A, $R_{DS(ON)}$ (Typ.) = 60mΩ@ $V_{GS} = 10V$
- ◆ Advanced Super Junction Technology
- ◆ Easy To Control Gate Switching
- ◆ 100% Avalanche Tested



Application

- ◆ Soft Switching Boost PFC switch
- ◆ Telecom Power, EV Charging, Solar inverter
- ◆ Phase-shift-bridge (ZVS), LLC Application-Server Power
- ◆ 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	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
I_{DM}	Drain Current-Pulsed ^b	162	
P_D	Maximum Power Dissipation, $T_C = 25^\circ\text{C}$	250	W
dv/dt	Peak Diode Recovery dv/dt	50	V/s
E_{AS}	Single Pulsed Avalanche Energy ^c	720	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.5	°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	$V_{GS} = 0V, I_D = 250\mu A$	655	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	2	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	±100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 14A$	-	60	72	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$f = 1.0MHz$	-	13.1	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 50V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	4528	-	pF
C_{oss}	Output Capacitance		-	414	-	
C_{rss}	Reverse Transfer Capacitance		-	3.0	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400V,$ $V_{GS} = 13V,$ $I_D = 17.1A,$ $R_G = 5.3\Omega$	-	21.6	-	ns
t_r	Turn-On Rise Time		-	10.7	-	
$t_{d(off)}$	Turn-Off Delay Time		-	86.6	-	
t_f	Turn-Off Fall Time		-	8.6	-	
Q_g	Total Gate Charge	$V_{DD} = 400V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 17.1A$	-	93.8	-	nC
Q_{gs}	Gate-Source Charge		-	24.8	-	
Q_{gd}	Gate-Drain Charge		-	34.9	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_F = 1A$	-	0.64	-	V
T_{rr}	Body Diode Reverse Recovery Time	$V_R = 400V, I_F = 33A$ $dI_F/dt = 60A/\mu s$	-	244	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$V_R = 400V, I_F = 33A$ $dI_F/dt = 60A/\mu s$	-	1.1	-	μC
I_{rrm}	Peak reverse recovery current	$V_R = 400V, I_F = 33A$ $dI_F/dt = 60A/\mu s$	-	8.9	-	A

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$.
- Repetitive rating; pulse width limited by maximum junction temperature.
- $L = 10mH, V_{DD} = 50V, I_{AS} = 12A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

■ Characteristic Curve

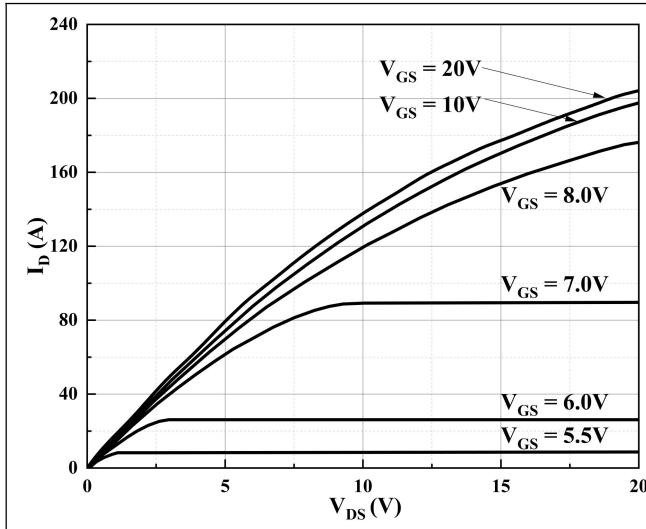


Figure 1. Typical Output Characteristics

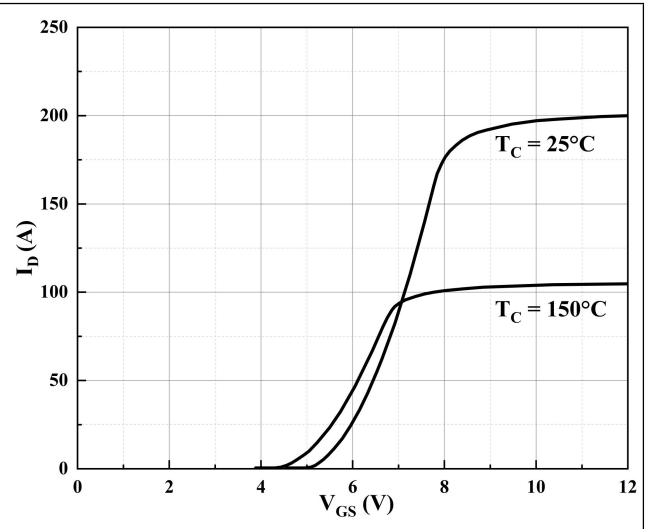


Figure 2. Typical Transfer Characteristics

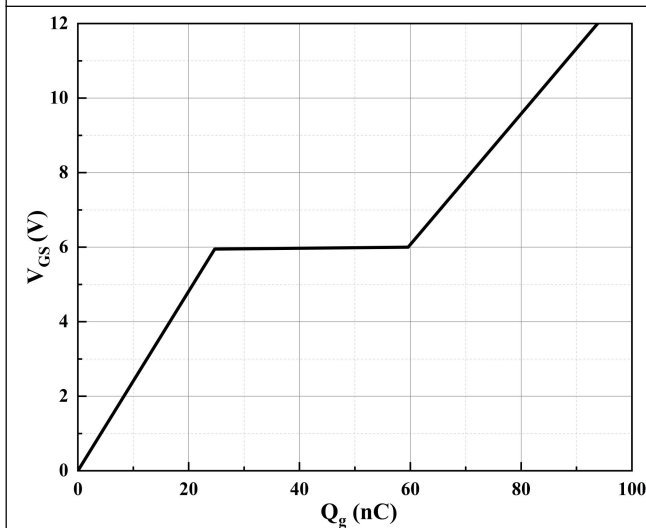


Figure 3. Typical Gate Charge

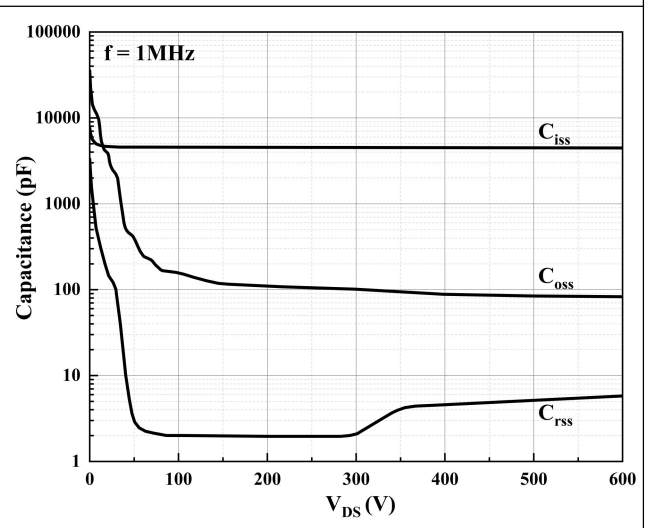


Figure 4. Typical Capacitance Characteristics

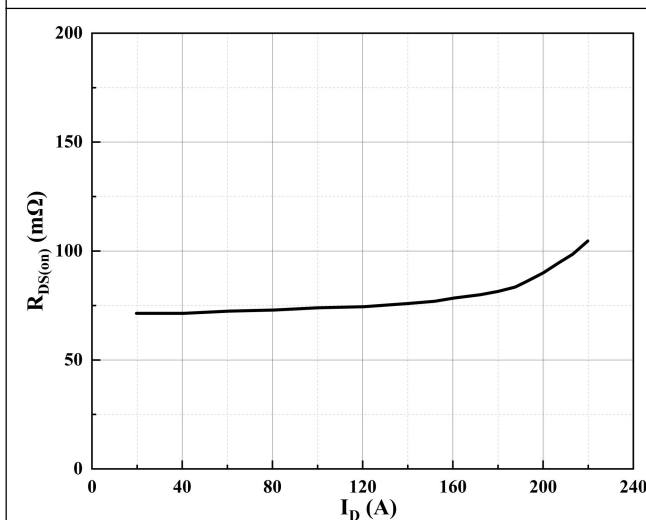


Figure 5. Static Drain-Source On-Resistance vs. Drain Current

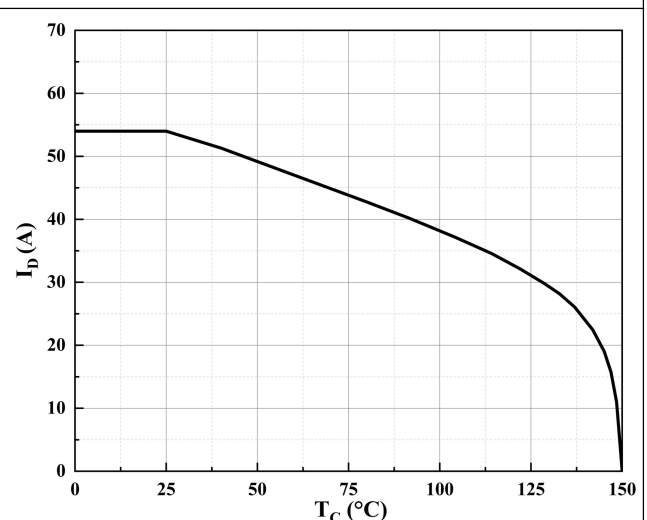


Figure 6. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

■ Characteristic Curve

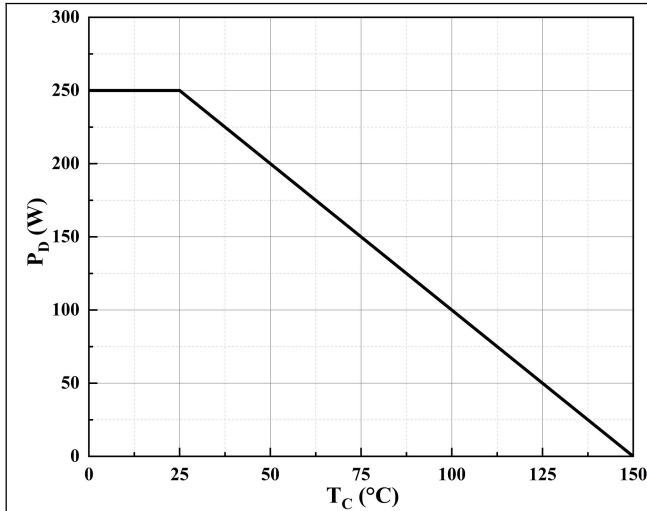


Figure 7. Typical Output Characteristics

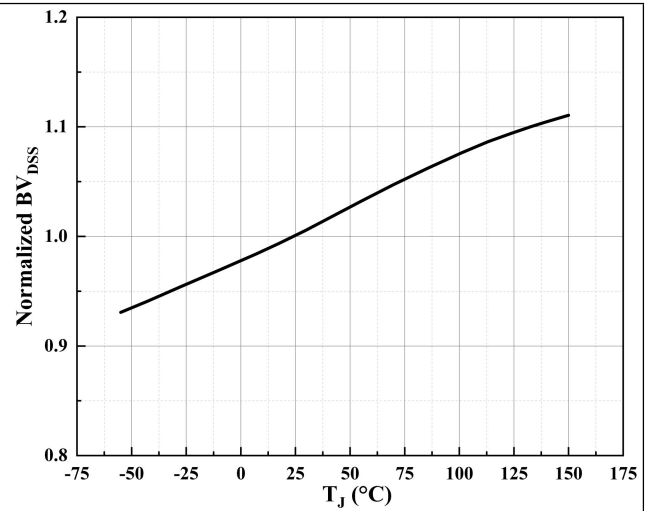


Figure 8. Normalized Drain-Source Breakdown Voltage vs. Junction Temperature

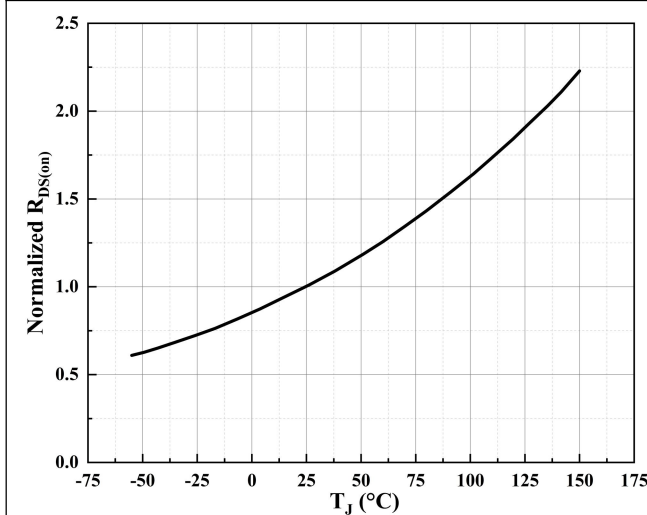


Figure 9. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

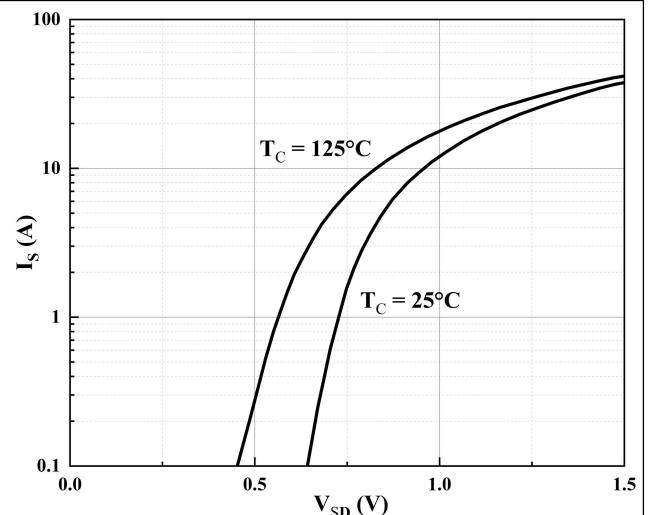


Figure 10. Body Diode Characteristics

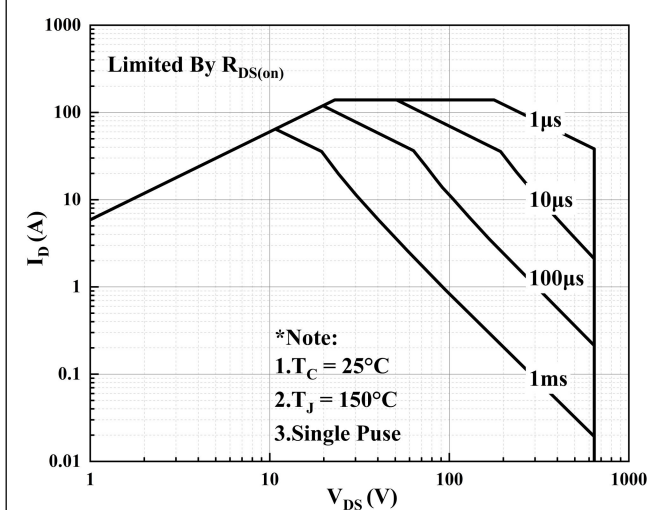


Figure 11. Maximum Safe Operating Area

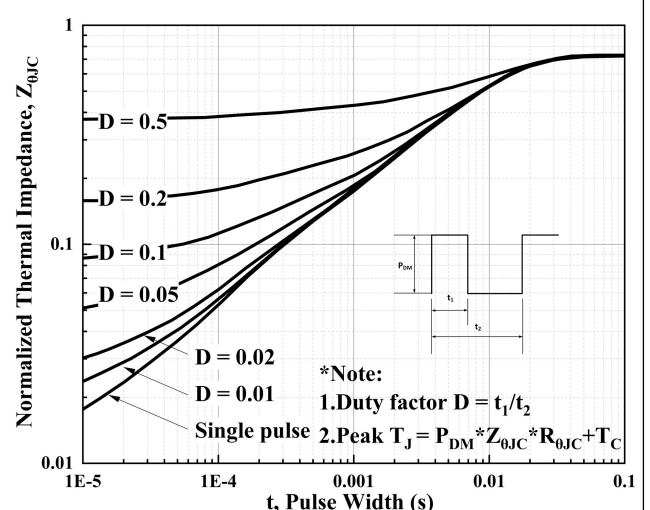
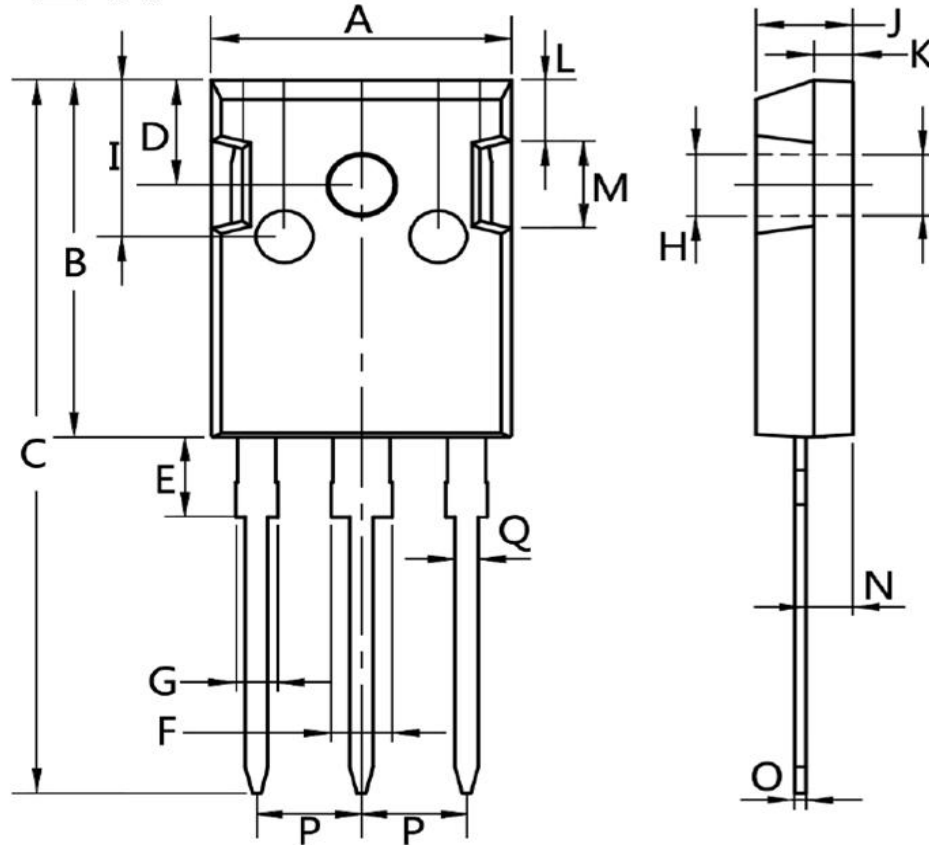


Figure 12. Normalized Maximum Transient Thermal Impedance

■ 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		