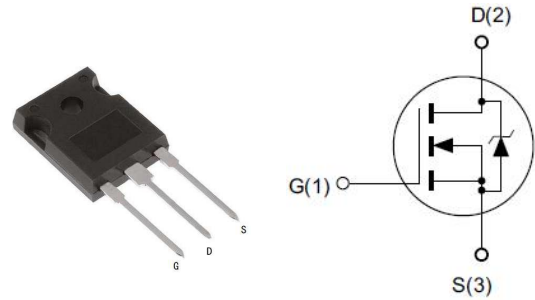


Features

- ◆ 600V, 111A, $R_{DS(ON)}(Typ.) = 17.5m\Omega @ V_{GS} = 10V$
- ◆ Advanced Super Junction Technology
- ◆ Easy To Control Gate Switching
- ◆ 100% Avalanche Tested



Application

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

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

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	600	V
V_{GS}	Gate-Source Voltage	± 30	
I_D	Drain Current-Continuous, $T_c = 25^\circ\text{C}$	111	A
I_{DM}	Drain Current-Pulsed ^b	333	
P_D	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	500	W
dv/dt	Peak Diode Recovery dv/dt ^c	50	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	1186	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	0.25	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	43	

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	$V_{GS} = 0V, I_D = 250\mu A$	600	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	-	-	5	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA



MJQA1N60FC

N-Channel Power MOSFET

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.8	-	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 5.5A$	-	17.5	22	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$f = 1.0MHz$	-	3.4	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 50V,$ $V_{GS} = 0V,$ $f = 10kHz$	-	12020	-	pF
C_{oss}	Output Capacitance		-	325.1	-	
C_{rss}	Reverse Transfer Capacitance		-	3.32	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400V,$ $V_{GS} = 10V,$ $I_D = 50A,$ $R_G = 2\Omega$	-	41.1	-	ns
t_r	Turn-On Rise Time		-	60.1	-	
$t_{d(off)}$	Turn-Off Delay Time		-	162	-	
t_f	Turn-Off Fall Time		-	5.8	-	
Q_g	Total Gate Charge	$V_{DD} = 400V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 50A$	-	219.3	-	nC
Q_{gs}	Gate-Source Charge		-	63.11	-	
Q_{gd}	Gate-Drain Charge		-	75.34	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_F = 1A$	-	0.61	-	V
T_{rr}	Body Diode Reverse Recovery Time	$V_R = 400V, I_F = 40A$ $di_F/dt = 100A/\mu s$	-	199.54	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$V_R = 400V, I_F = 40A$ $di/dt = 100A/\mu s$	-	2.023	-	μC
I_{rrm}	Peak reverse recovery current	$V_R = 400V, I_F = 40A$ $di/dt = 100A/\mu s$	-	18.54	-	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 $\leq 2\%$
- $L = 10mH, V_{DD} = 100V, I_{AS} = 15.4A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.

■ Characteristic Curve

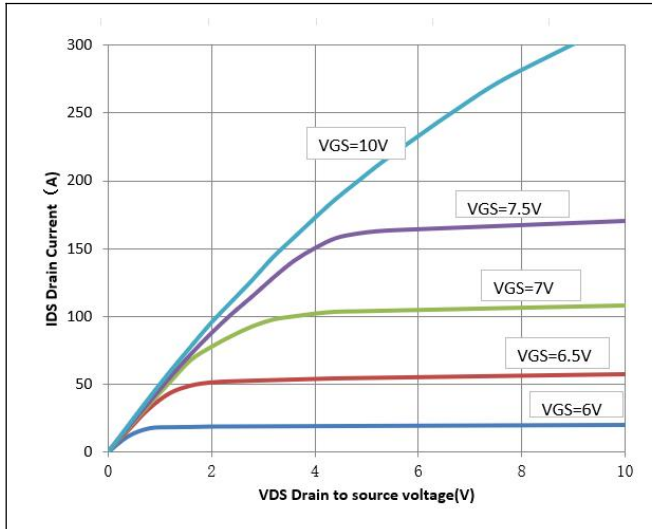


Figure 1. Typical Output Characteristics

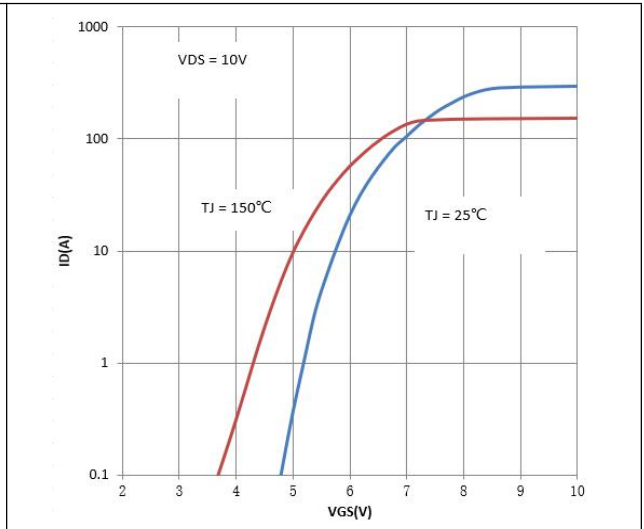


Figure 2. Typical Transfer Characteristics

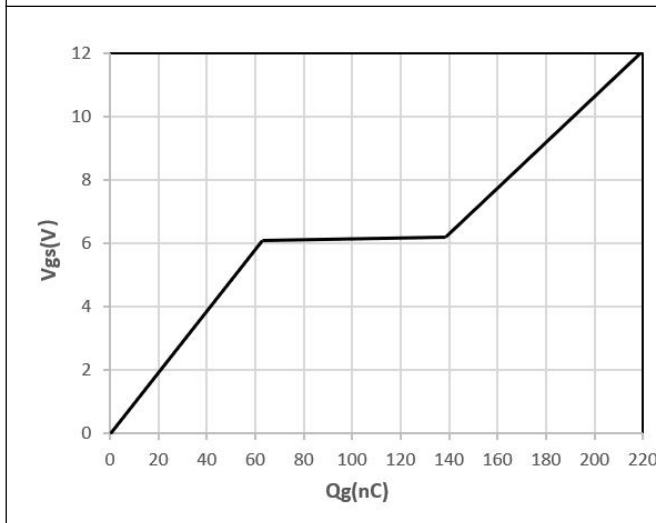


Figure 3. Typical Gate Charge

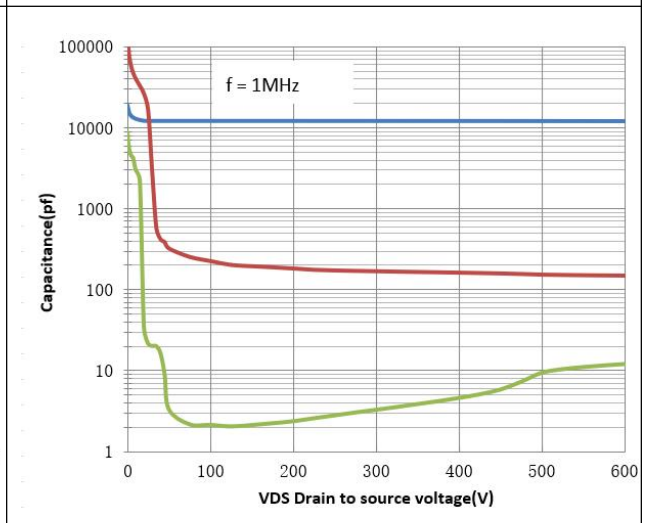


Figure 4. Typical Capacitance

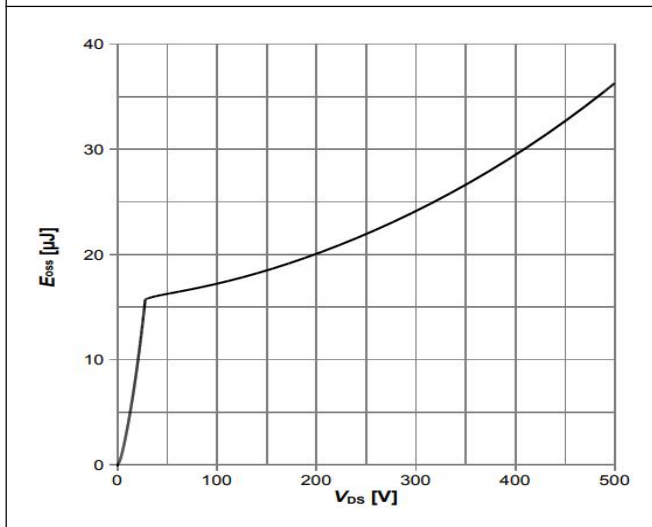


Figure 5. Typical C_{oss} Stored Energy

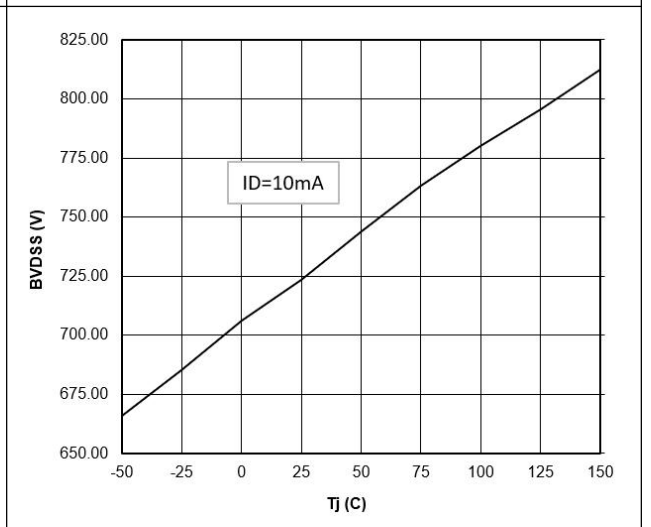


Figure 6. Drain-source Breakdown Voltage

■ Characteristic Curve

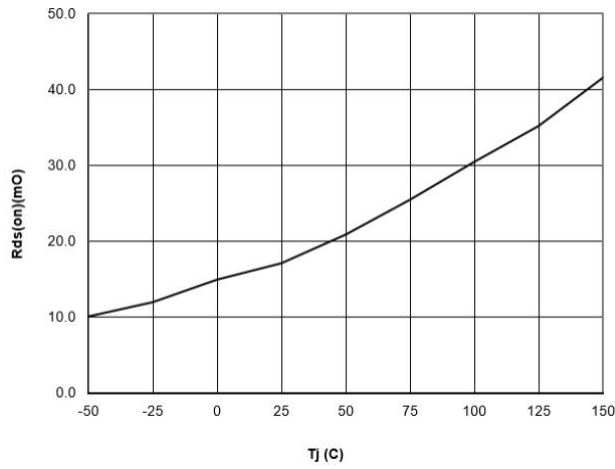


Figure 7. Typical On-Resistance vs Junction Temperature

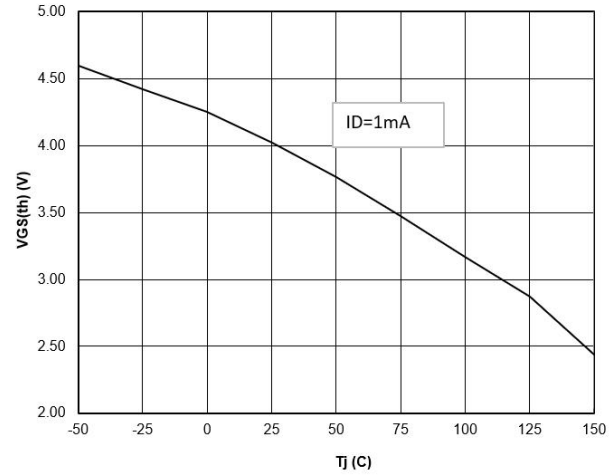


Figure 8. Typ. Threshold voltage

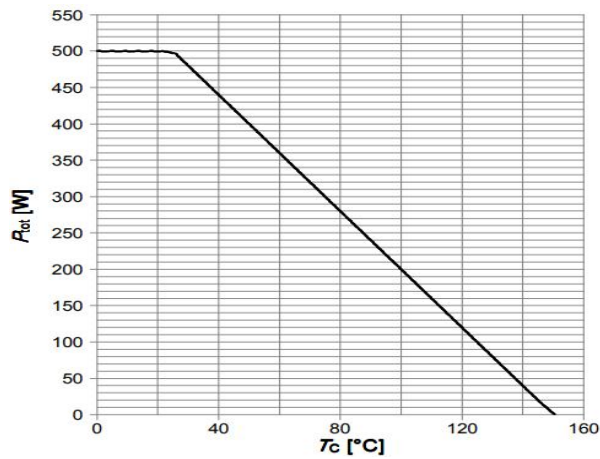


Figure 9. Typ. Power Dissipation

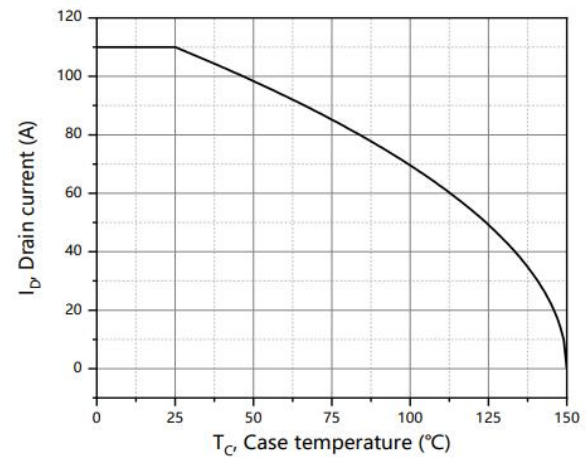


Figure 10. Typ. Drain Current De-rating

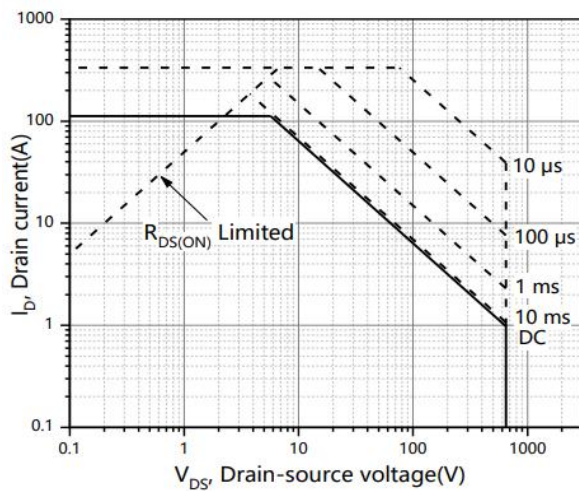


Figure 11. Typ. Maximum Safe Operating Area

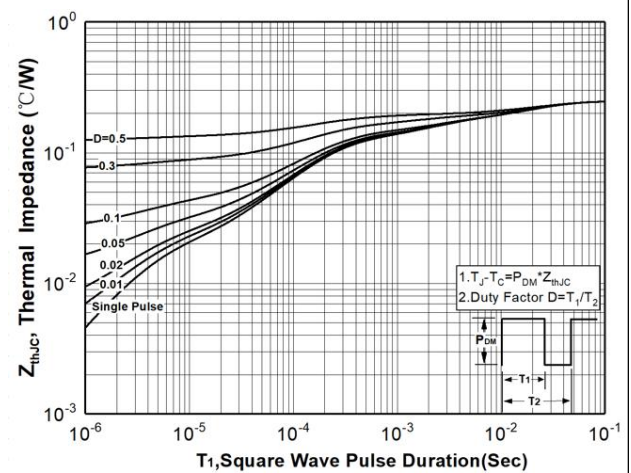


Figure 12. Typ. Max. transient thermal impedance

■ Package Information

TO-247-3L

