

Features

- Low On-resistance and Low Conduction Loss
- Super Junction technology for High Voltage Application
- Soft Switching with Fast Reverse Recovery Diode
- Ultra Low Gate Charge Cause Lower Driving Requirement
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free."Green "Device^(Note 1)
- Lead Free Finish/RoHS Compliant. "P" Suffix Designates RoHS Compliant. See Ordering Information

Maximum Ratings

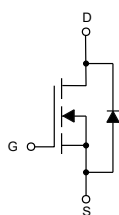
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance Junction to Ambient,Max^(Note 2): 62°C/W
- Thermal Resistance Junction to Case,Max : 0.56°C/W

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V _{DS}	600	V
Gate-Source Voltage		V _{GS}	±30	V
Continuous Drain Current	T _C =25°C	I _D	58	A
	T _C =100°C		36.7	
Pulsed Drain Current ^(Note 3)		I _{DM}	232	A
Total Power Dissipation, T _C =25°C		P _D	223	W
Single Avalanche Energy ^(Note 4)		E _{AS}	2371	mJ

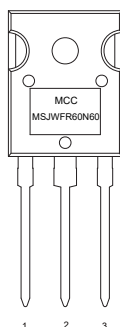
Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <100ppm antimony compounds.
2. Device in a still air environment with $T_A=25^\circ\text{C}$.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. Starting $T_J=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $I_{AS}=15.4\text{A}$.

Internal Structure and Marking Code



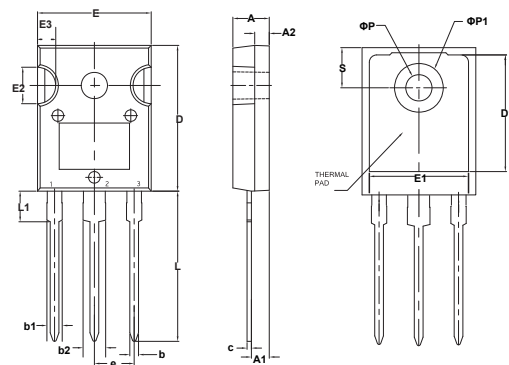
1. Gate
2. Drain
3. Source



Device Code: MSJWFR60N60

N-CHANNEL Super-Junction Power MOSFET

TO-247AB(E)



DIMENSIONS

DIM	INCHES		mm		NOTE
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.087	0.102	2.20	2.60	
A2	0.059	0.098	1.50	2.50	
b	0.035	0.055	0.90	1.40	
b1	0.063	0.094	1.60	2.40	
b2	0.098	0.138	2.50	3.50	
c	0.014	0.035	0.35	0.90	
D	0.776	0.815	19.70	20.70	
D1	0.512	-	13.00	-	
E	0.598	0.630	15.20	16.00	
E1	0.528	-	13.40	-	
E2	0.177	0.217	4.50	5.50	
E3	0.091	0.106	2.30	2.70	
e	0.215		5.45		TYP
L	0.768	0.827	19.50	21.00	
L1	-	0.169	-	4.30	
P	0.134	0.150	3.40	3.80	Φ
P1	-	0.291	-	7.40	Φ
S	0.217		5.50		TYP

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =1mA	600			V
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±30V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =5mA	3	4	5	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =37.5A		26.5	30	mΩ
Gate Resistance	R _g	f=1MHz, open drain		1		Ω
Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =37.5A		0.9	1.2	v
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =37.5A dI _F /dt=100A/μs		165		ns
Reverse Recovery Charge	Q _{rr}			1450		nC
Peak Reverse Recovery Current	I _{rrm}			15		A
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =100V, V _{GS} =0V, f=1MHz		8078		pF
Output Capacitance	C _{oss}			300		
Output capacitance - energy related	C _{o(er)}	V _{DS} =0 to 400V, V _{GS} =0V		301		
Output capacitance - time related	C _{o(tr)}			1950		
Total Gate Charge	Q _g	V _{DS} =400V, V _{GS} =10V, I _D =37.5A		197		nC
Gate-Source Charge	Q _{gs}			49		
Gate-Drain Charge	Q _{gd}			95		
Turn-On Delay Time	t _{d(on)}	V _{DD} =400V, V _{GS} =10V R _G =2.7Ω, I _D =37.5A		73		ns
Turn-On Rise Time	t _r			26		
Turn-Off Delay Time	t _{d(off)}			86		
Turn-Off Fall Time	t _f			10		

Typical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 1 - Typical Output Characteristics

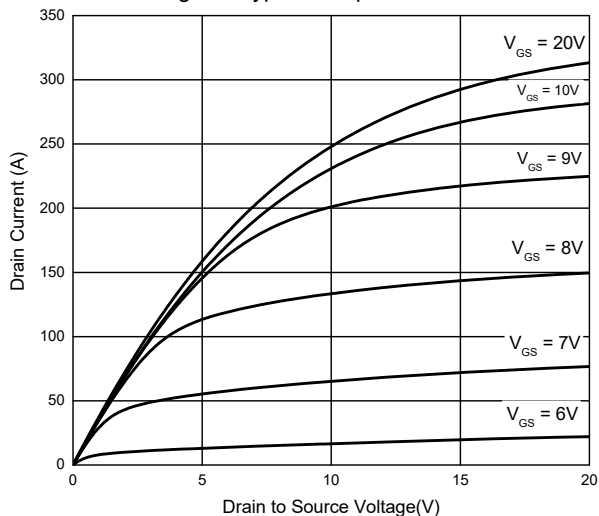


Fig. 2 - Typical Transfer Characteristics

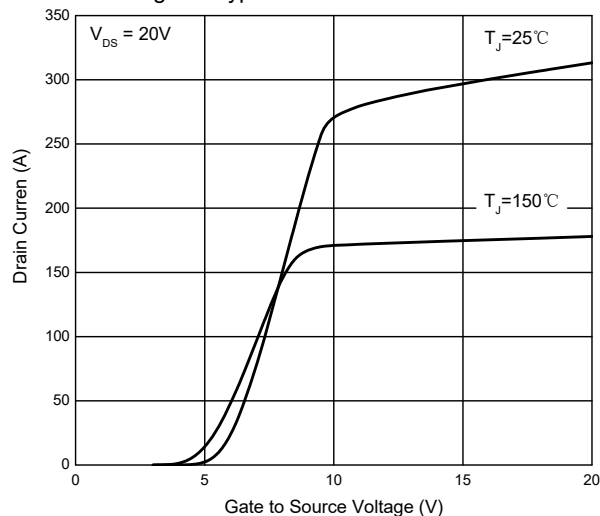


Fig. 3 - On-Resistance vs Gate Bias

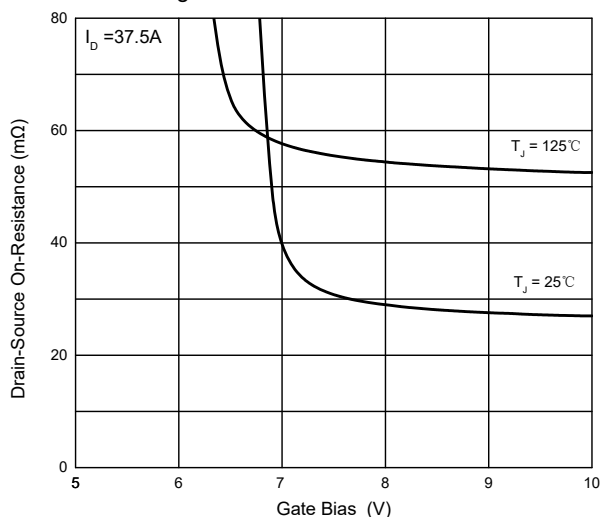


Fig. 4 - On-Resistance vs Drain Current

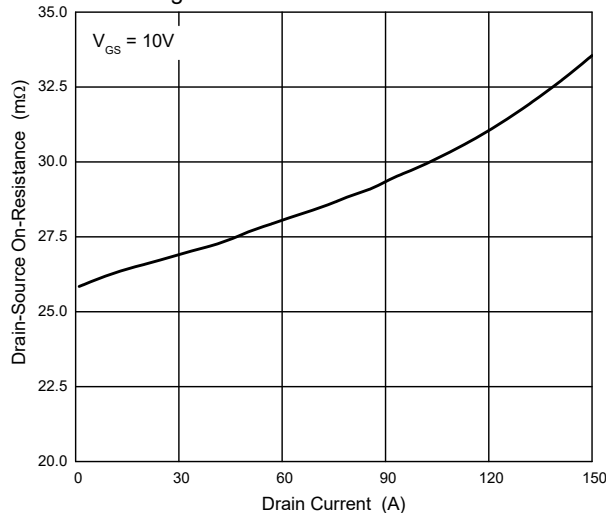


Fig. 5 - Capacitance Characteristic

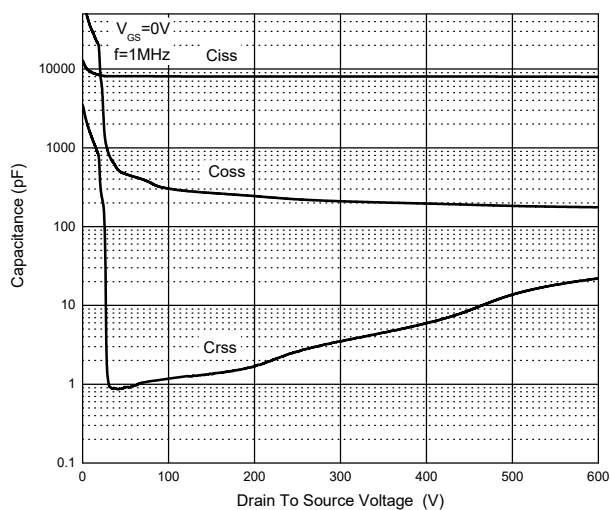
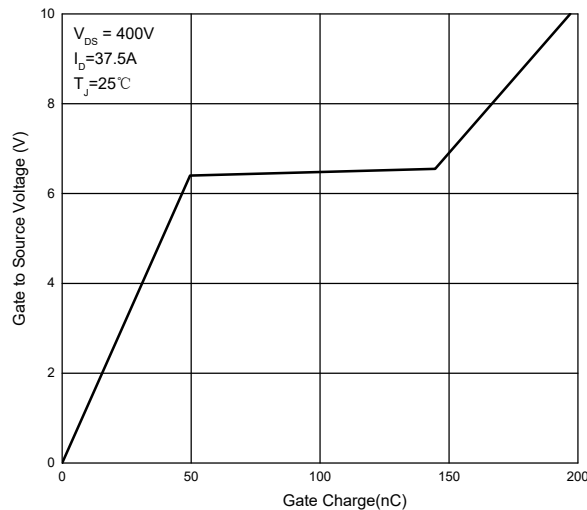


Fig. 6 - Typical Gate Charge



Typical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 7 - Gate-Threshold Voltage vs Junction Temperature

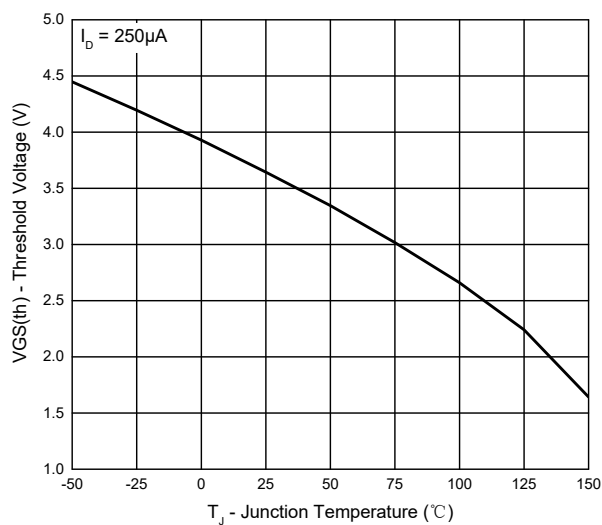


Fig. 8 - Normalized On-Resistance

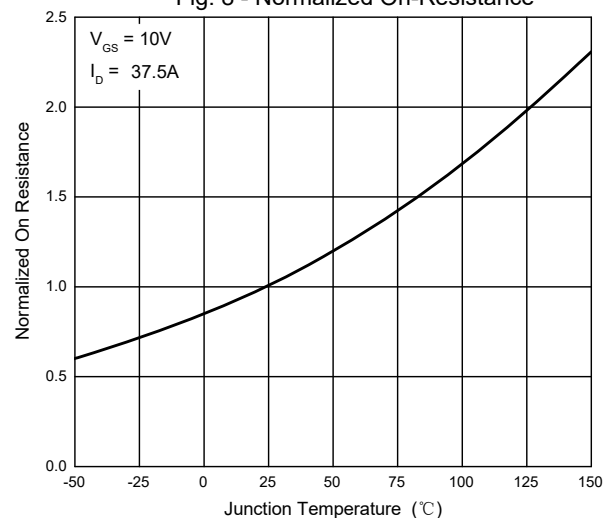


Fig. 9 - Forward Characteristics

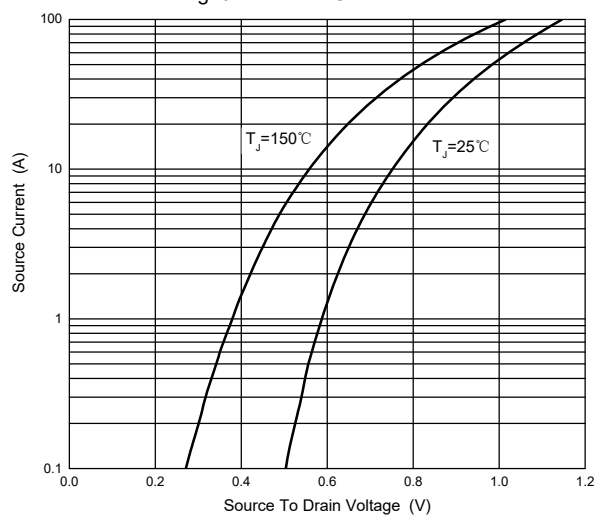


Fig. 10- Drain Current

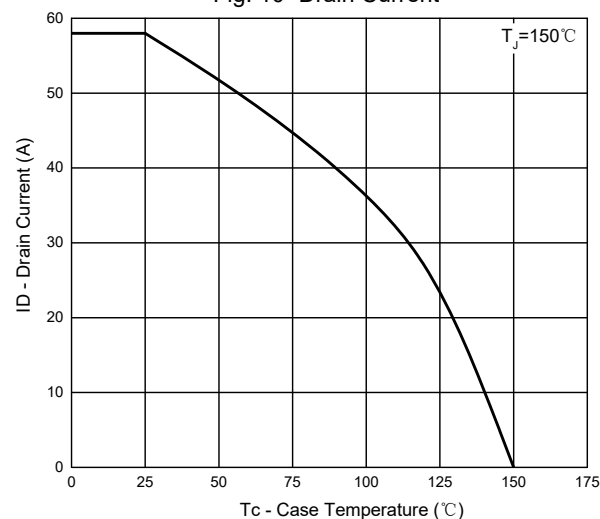


Fig. 11 - Power Dissipation

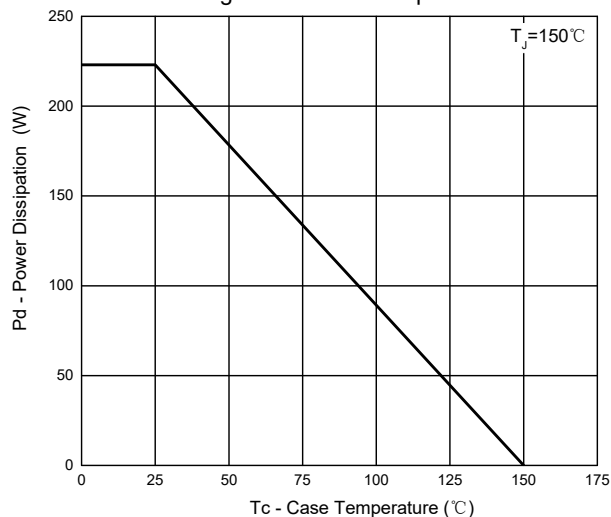
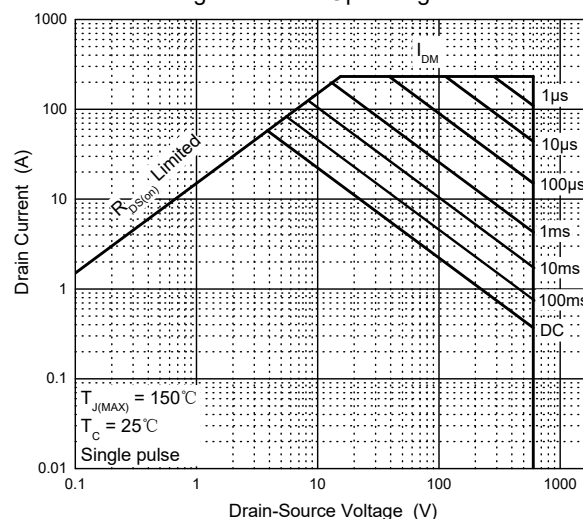
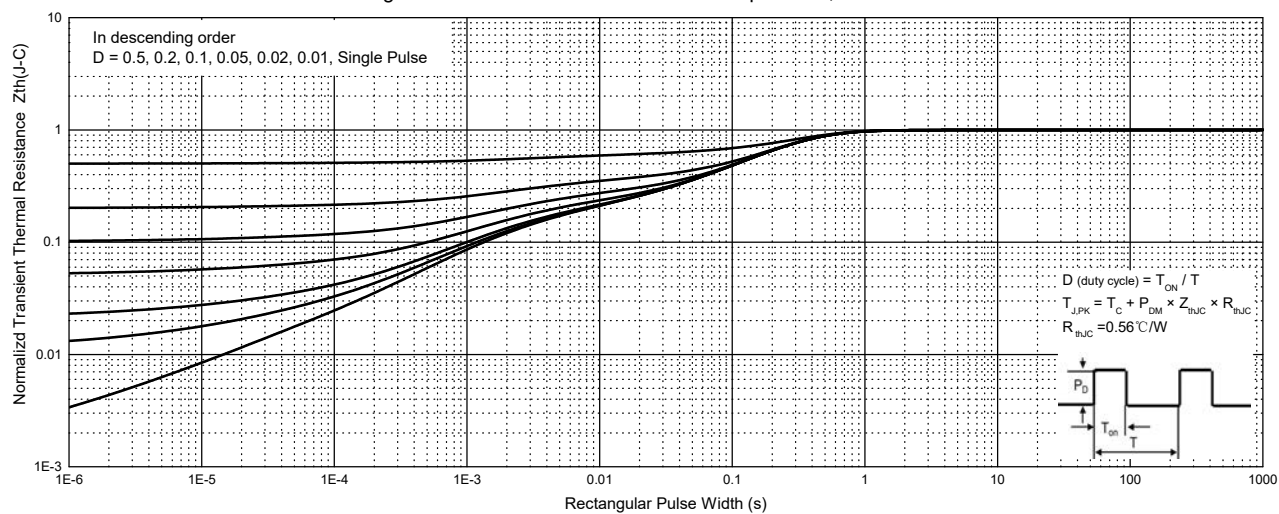


Fig. 12 - Safe Operating Area



Typical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig.13 - Normalized Transient Thermal Impedance, Junction-Case



Ordering Information

Device	Packing
MSJWFR60N60-BP	Tube:30pcs/Tube, 360pcs/Box, 1.8K/Ctn;

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