

MJ N-Channel Super Trench Power MOSFET

Description

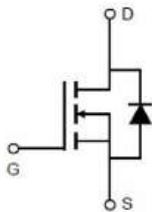
The MJXP40T15A uses Super Trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

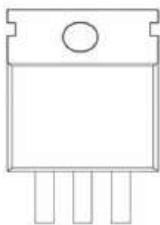
- ◆ $V_{DS}=40V, I_D=150A$
 $R_{DS(ON)}=1.75m\Omega$ (typical) @ $V_{GS}=10V$
- ◆ Excellent gate charge x $R_{DS(on)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(on)}$
- ◆ 150 °C operating temperature
- ◆ Pb-free lead plating
- ◆ 100% UIS tested

Application

- ◆ DC/DC Converter
- ◆ Ideal for high-frequency switching and synchronous rectification



Schematic Diagram



Marking and pin assignment



TO-220-3L top view

100% UIS TESTED! 100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJXP40T15A	MJXP40T15A	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous (Silicon Limited)	I_D	150	A
Drain Current-Continuous ($T_c=100^{\circ}C$)	$I_{D(100^{\circ}C)}$	106	A
Pulsed Drain Current (Package Limited)	I_{DM}	400	A
Maximum Power Dissipation	P_D	210	W
Derating factor		1.4	W/ $^{\circ}C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	720	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^{\circ}C$

Thermal Characteristic

Thermal Resistance,Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.71	$^{\circ}C/W$
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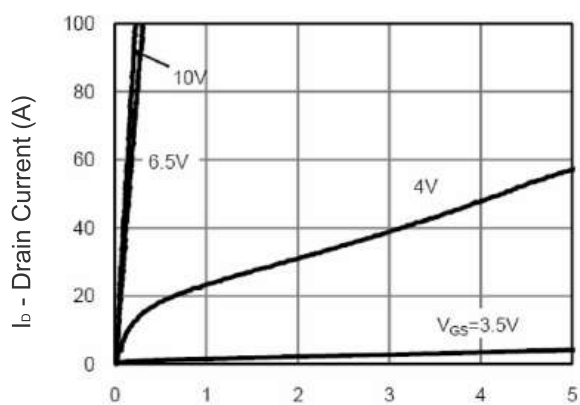
Electrical Characteristics (T_A =25°Cunless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =±20V,V _{GS} =0V	-	-	±100	nA
On Characteristics <small>(Note 3)</small>						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2	2.7	3.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =75A	-	1.75	1.95	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =75A	-	80	-	S
Dynamic Characteristics <small>(Note 4)</small>						
Input Capacitance	C _{iss}	V _{DS} =20V,V _{GS} =0V F=1.0MHz	-	4900	-	PF
Output Capacitance	C _{oss}		-	1250	-	PF
Reverse Transfer Capacitance	C _{rss}		-	80	-	PF
Switching Characteristics <small>(Note 4)</small>						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V,I _D =75A V _{GS} =10V,R _G =1.6Ω	-	12	-	nS
Turn-on Rise Time	t _r		-	6.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	48	-	nS
Turn-Off Fall Time	t _f		-	8.0	-	nS
Total Gate Charge	Q _g	V _{DS} =20V,I _D =75A V _{GS} =10V	-	81	-	nC
Gate-Source Charge	Q _{gs}		-	13	-	nC
Gate-Drain Charge	Q _{gd}		-	9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <small>(Note 3)</small>	V _{SD}	V _{GS} =0V,I _S =75A	-	-	1.2	V
Diode Forward Current <small>(Note 2)</small>	I _S		-	-	150	A
Reverse Recovery Time	t _{rr}	T _J =25°C, I _F =I _S di/dt=100A/μs <small>(Note 3)</small>	-	-	29	nS
Reverse Recovery Charge	Q _{rr}		-	-	105	nC

Notes:

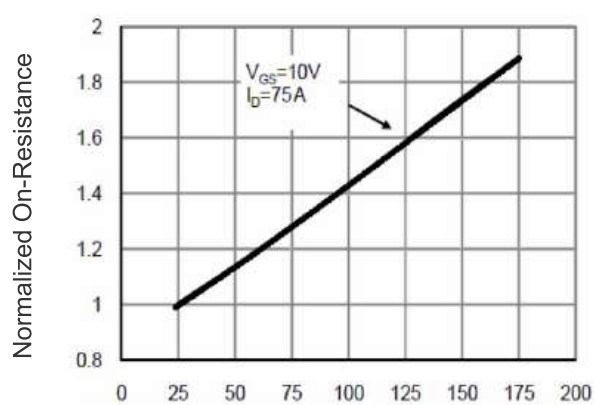
- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② Surface Mounted on FR4 Board, t ≤ 10 sec.
- ③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ④ Guaranteed by design, not subject to production
- ⑤ EAS condition: T_j=25°C, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25Ω

Typical Electrical and Thermal Characteristics



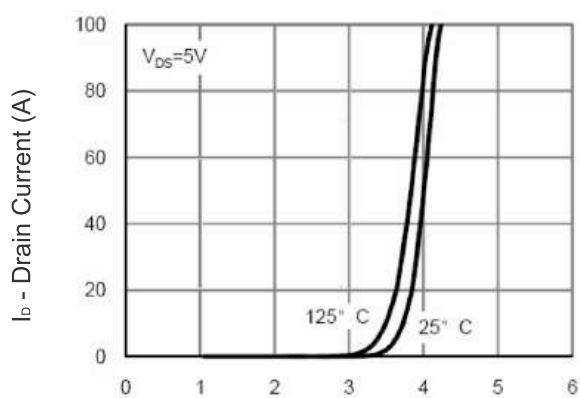
Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



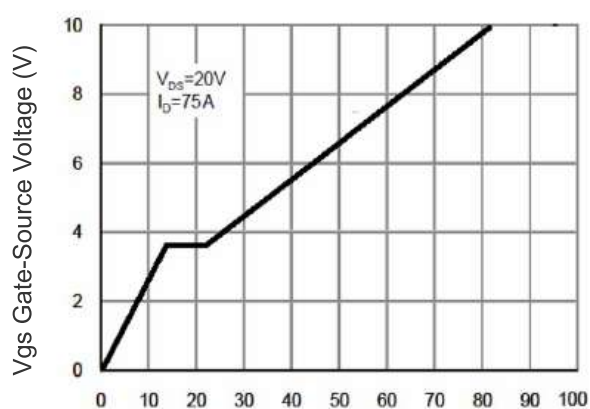
Tj -Junction Temperature(°C)

Figure 4 Rdson-Junction Temperature



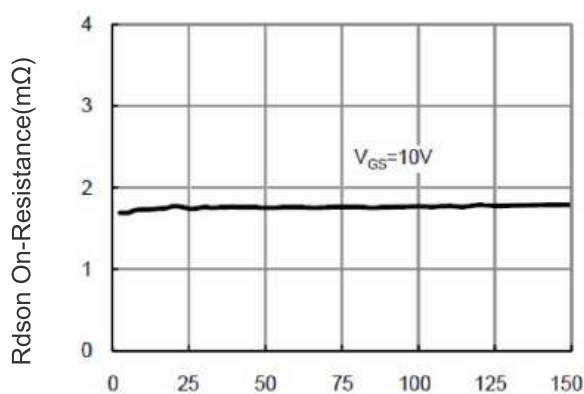
Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



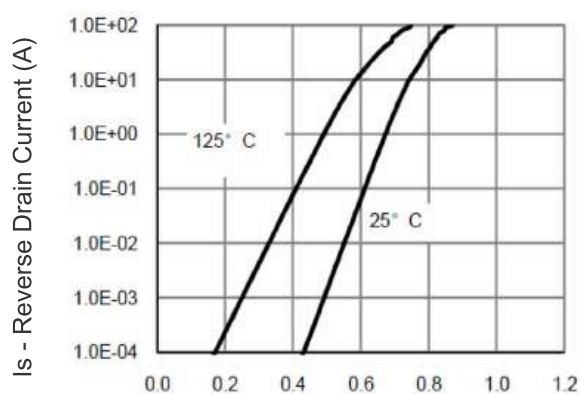
Qg Gate Charge (nC)

Figure 5 Gate Charge



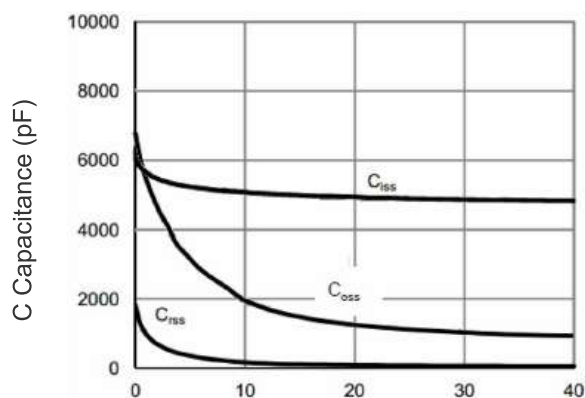
Id - Drain Current (A)

Figure 3 Rdson- Drain Current

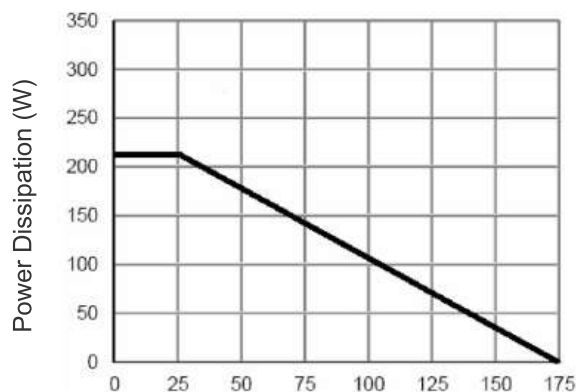


Vsd Source-Drain Voltage (V)

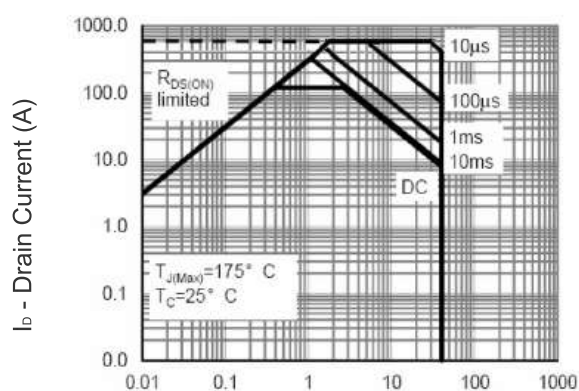
Figure 6 Source- Drain Diode Forward



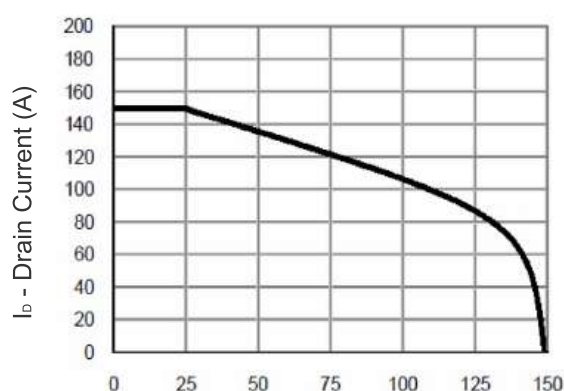
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



TJ -Junction Temperature(°C)
Figure 9 Power De-rating



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



TJ -Junction Temperature(°C)
Figure 10 Power De-rating

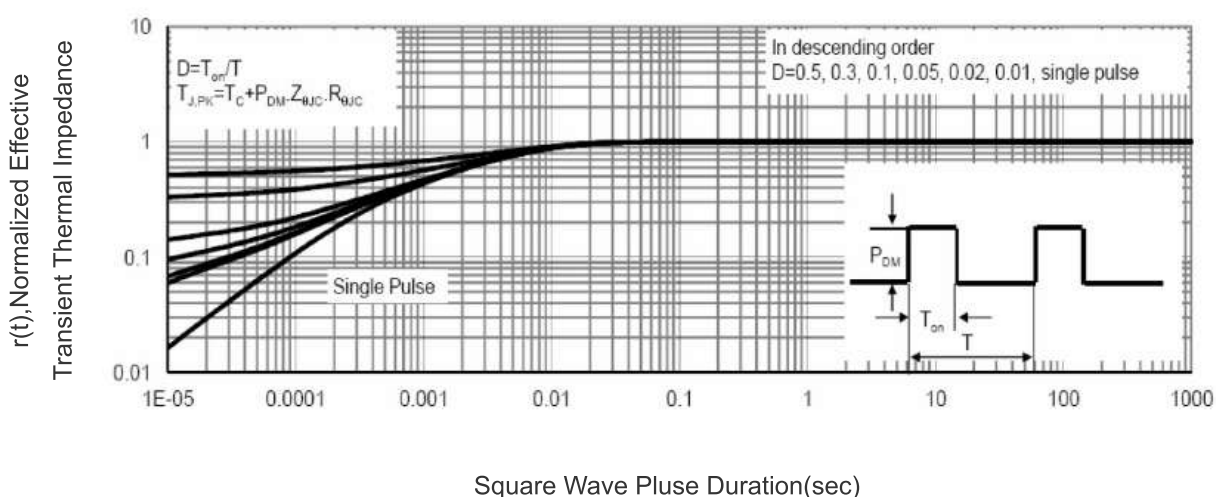
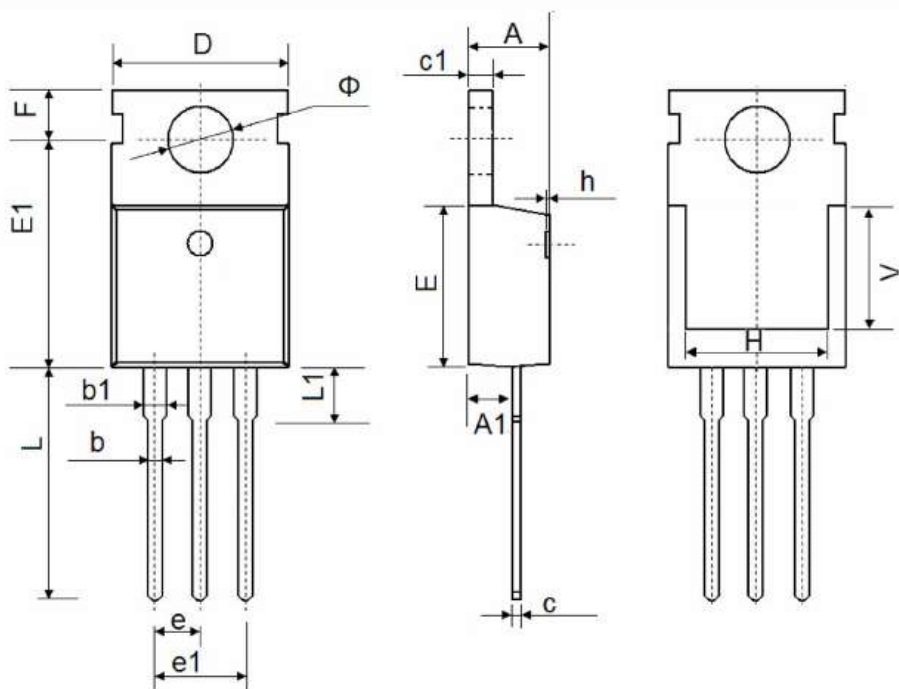


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150

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