

MJ N-Channel Super Trench Power MOSFET

Description

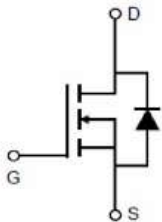
The MJXP40T19GU uses Super Trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

- ◆ $V_{DS}=40V, I_D=185A$
 $R_{DS(ON)}=1.0m\Omega$ (typical) @ $V_{GS}=10V$
 $R_{DS(ON)}=1.4m\Omega$ (typical) @ $V_{GS}=4.5V$
- ◆ 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



Top View



Bottom View

100% UIS TESTED! 100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJXP40T19GU	MJXP40T19GU	DFN5X6-8L	-	-	-

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	185	A
Drain Current-Continuous ($T_c=100^{\circ}C$)	$I_{D(100^{\circ}C)}$	140	A
Pulsed Drain Current (Package Limited)	I_{DM}	400	A
Maximum Power Dissipation	P_D	160	W
Derating factor		1.28	W/ $^{\circ}C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	1200	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.78	$^{\circ}C/W$
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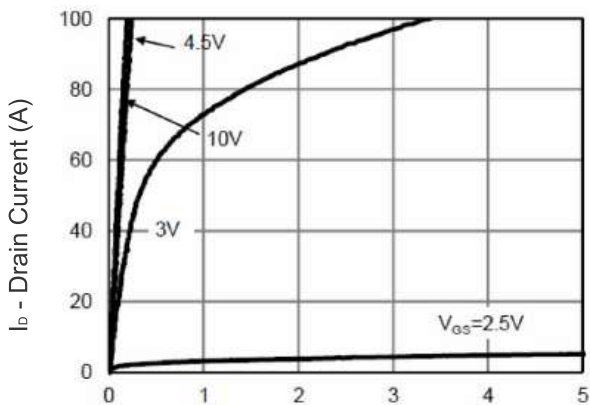
Electrical Characteristics (T_c=25°C unless otherwise noted)

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 _{DS} =0V	-	-	±100	nA
On Characteristics <small>(Note 3)</small>						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	1.2	1.5	2.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V,I _D =95A	-	1.0	1.2	mΩ
		V _{GS} =4.5V,I _D =95A	-	1.4	1.7	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =95A	-	80	-	S
Dynamic Characteristics <small>(Note 4)</small>						
Input Capacitance	C _{iss}	V _{DS} =20V,V _{GS} =0V F=1.0MHz	-	7400	8800	PF
Output Capacitance	C _{oss}		-	1930	2300	PF
Reverse Transfer Capacitance	C _{rss}		-	110	130	PF
Switching Characteristics <small>(Note 4)</small>						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V,I _D =95A V _{GS} =10V,R _G =1.6Ω	-	14.1	-	nS
Turn-on Rise Time	t _r		-	7.9	-	nS
Turn-Off Delay Time	t _{d(off)}		-	56.5	-	nS
Turn-Off Fall Time	t _f		-	9.6	-	nS
Total Gate Charge	Q _g	V _{DS} =20V,I _D =95A V _{GS} =10V	-	125	140	nC
Gate-Source Charge	Q _{gs}		-	18	-	nC
Gate-Drain Charge	Q _{gd}		-	13	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V,I _S =95A	-	-	1.2	V
Diode Forward Current	I _S		-	-	185	A
Reverse Recovery Time	t _{rr}	T _J =25°C,I _F = I _S di/dt= 100A/μs <small>(Note 3)</small>	-	-	35	nS
Reverse Recovery Charge	Q _{rr}		-	-	124	nC

Notes:

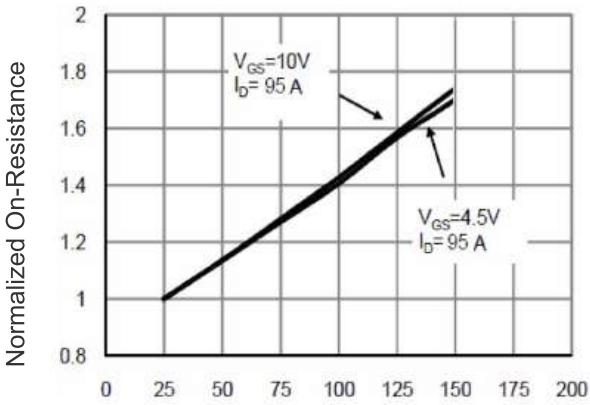
- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② Surface Mounted on FR4 Board, t ≤ 10 sec.
- ③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ④ Guaranteed by design, not subject to production
- ⑤ EAS condition : T_J=25°C, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25Ω

Typical Electrical and Thermal Characteristics



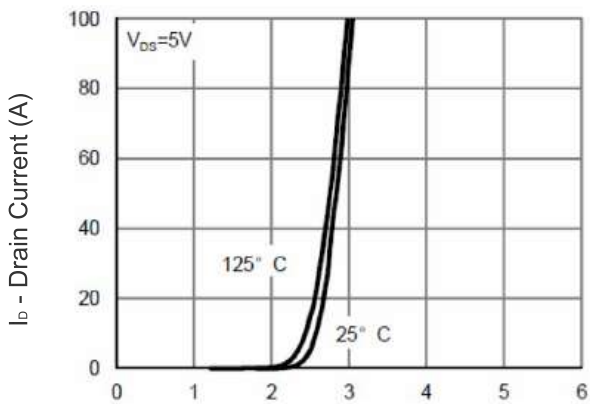
Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



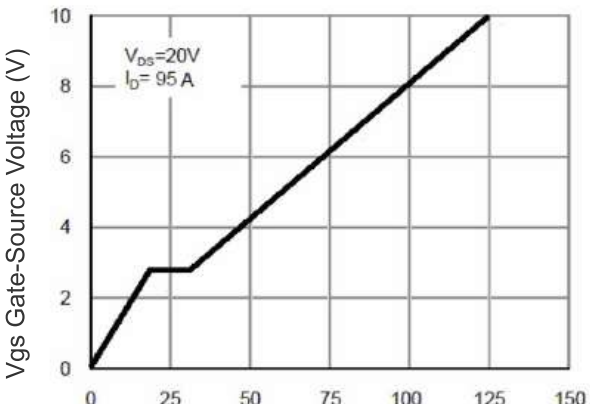
Tj-Junction Temperature (°C)

Figure 4 Rdson-Junction Temperature



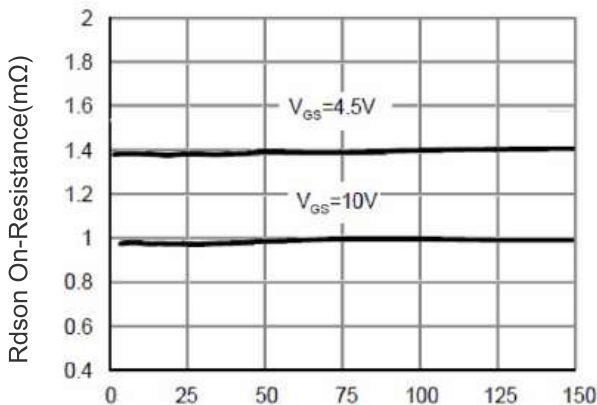
Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



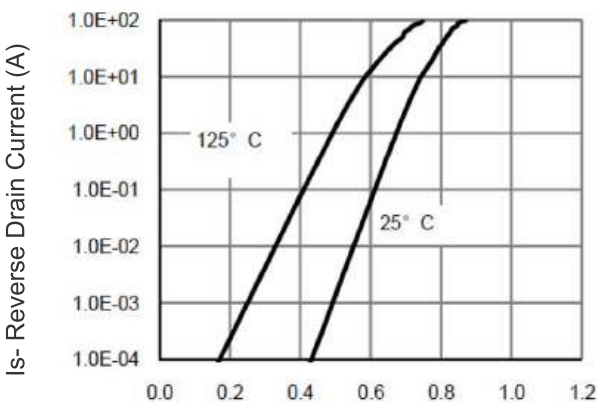
Qg Gate Charge (nC)

Figure 5 Gate Charge



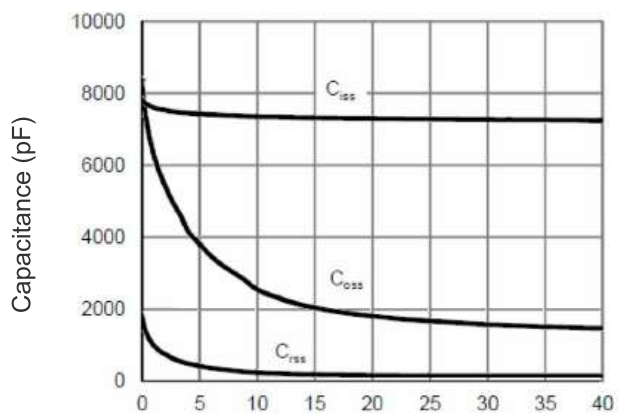
Id - Drain Current (A)

Figure 3 Rdson- Drain Current



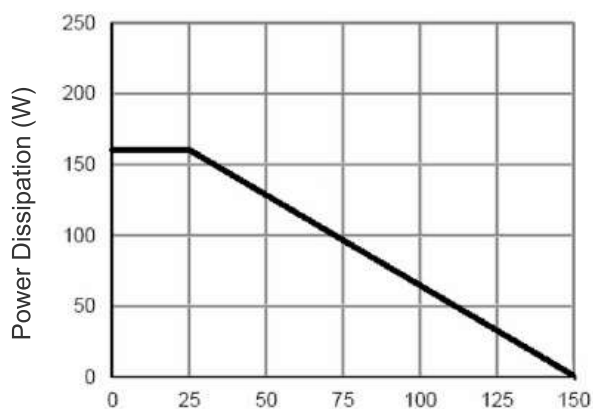
Vsd Source-Drain Voltage (V)

Figure 6 Source- Drain Diode Forward



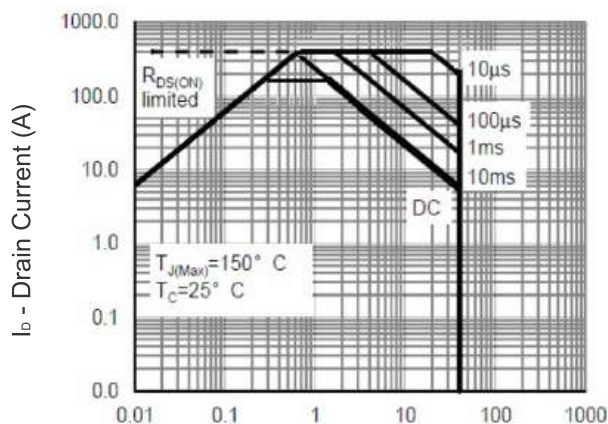
Vds Drain-Source Voltage (V)

Figure 7 Capacitance vs Vds



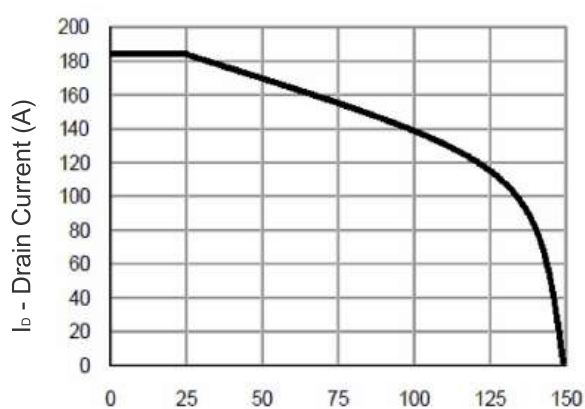
TJ-Junction Temperature(°C)

Figure 9 Power De-rating



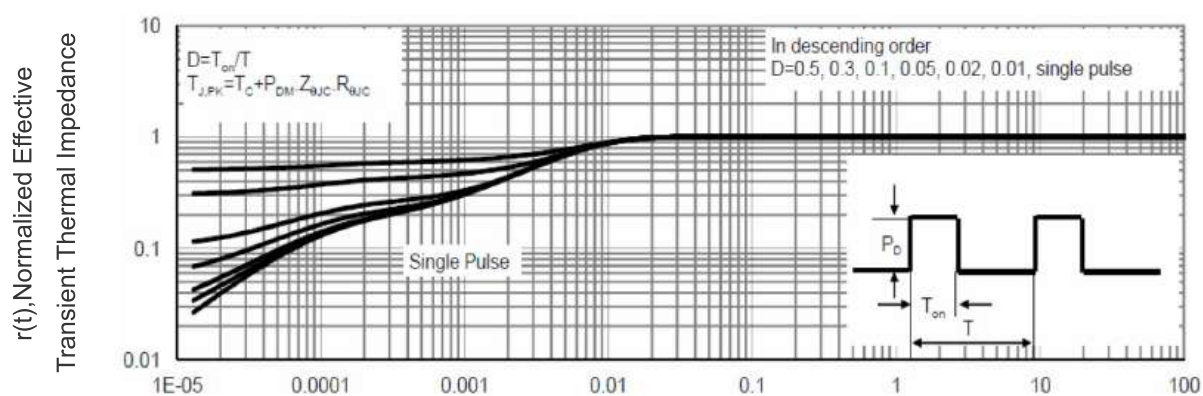
Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area



TJ-Junction Temperature(°C)

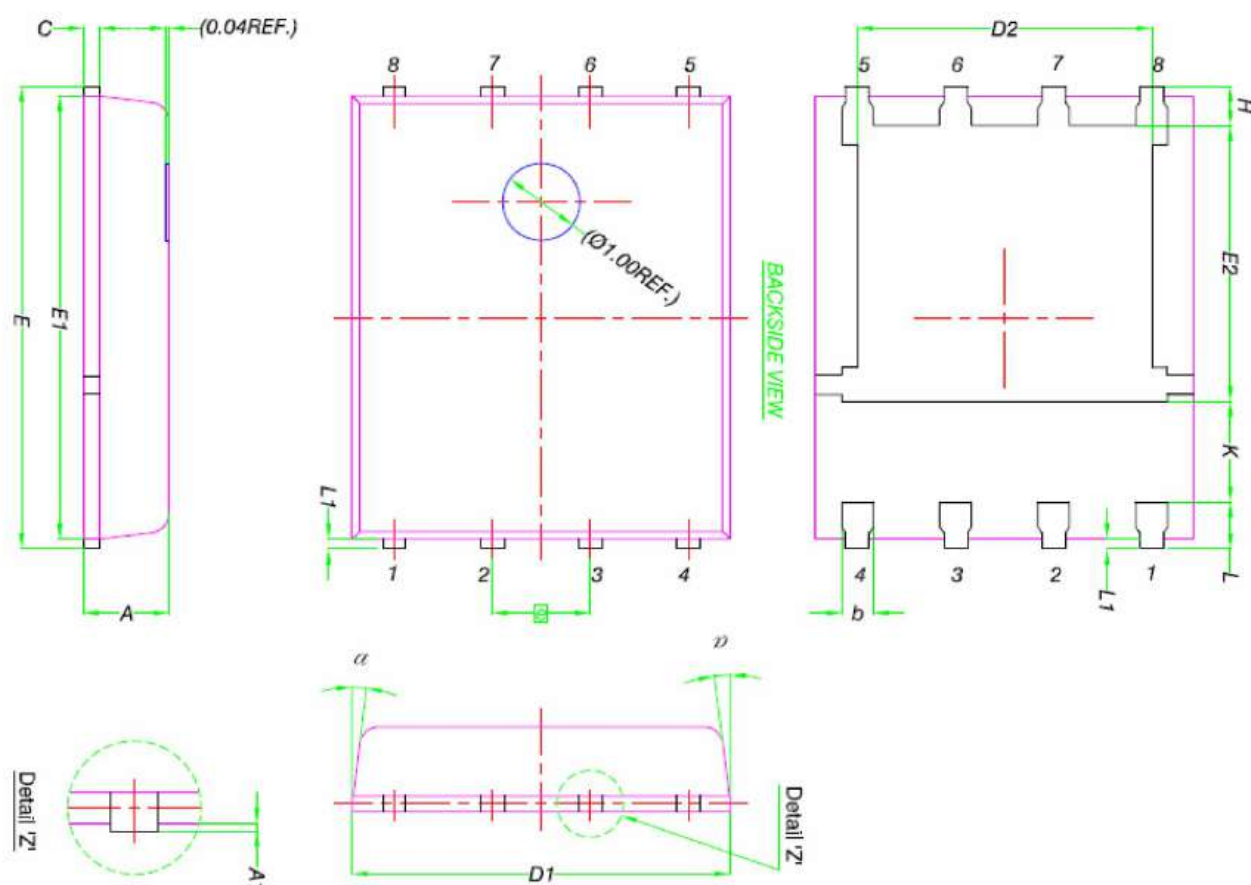
Figure 10 Current De-rating



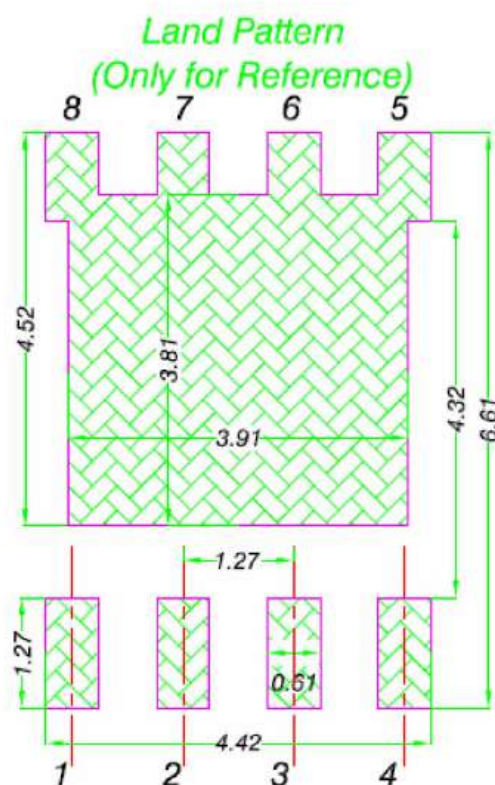
Square Wave Pulse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°



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