MJ N-Channel Super Trench Power MOSFET

Description

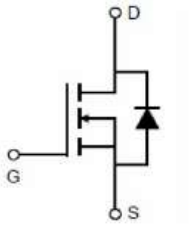
The MJXP40T17AWD uses Super Trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.

General Features

- V_{DS}=40V,I_D=170A
  $R_{DS(ON)}$=1.3mΩ (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

TO-263T-2L top view

100% UIS TESTED! 100% ΔVds TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJXP40T17AWD	MJXP40T17AWD	TO-263T-2L	-	-	-

Absolute Maximum Ratings (T_C=25℃ 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	170	A
Drain Current-Continuous(T_C =100℃)	$I_{D(100℃)}$	120	A
Pulsed Drain Current (Package Limited)	I_{DM}	680	A
Maximum Power Dissipation	P_D	250	W
Derating factor		1.67	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	1200	mJ
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	0.6	℃/W
Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	60	℃/W

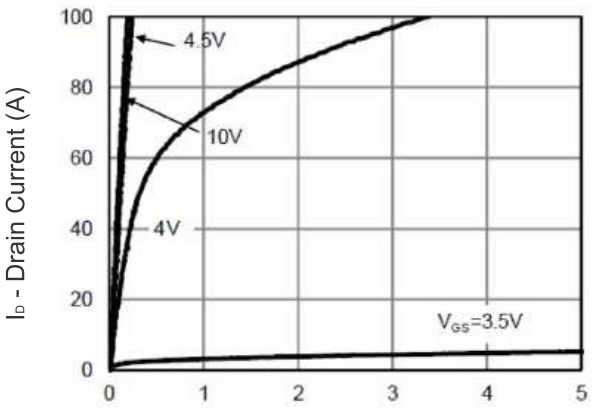
Electrical Characteristics (T_C=25℃ unless otherwise noted)

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 (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} ,I_D=250μA	2.0	2.5	3.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=85A	-	1.3	1.6	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=85A	-	80	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=20V,V_{GS}=0V F=1.0MHz	-	5670	-	PF
Output Capacitance	C_{oss}		-	1930	-	PF
Reverse Transfer Capacitance	C_{rss}		-	62	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V,I_D=85A V_{GS}=10V,R_G=1.6Ω	-	13.5	-	nS
Turn-on Rise Time	t_r		-	7.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	55	-	nS
Turn-Off Fall Time	t_f		-	8.6	-	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=85A V_{GS}=10V	-	88.6	-	nC
Gate-Source Charge	Q_{gs}		-	16	-	nC
Gate-Drain Charge	Q_{gd}		-	13	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=85A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	170	A
Reverse Recovery Time	t_{rr}	T_J=25°C,I_F=I_S di/dt= 100A/μs (Note 3)	-	-	33	nS
Reverse Recovery Charge	Q_{rr}		-	-	119	nC

Notes:

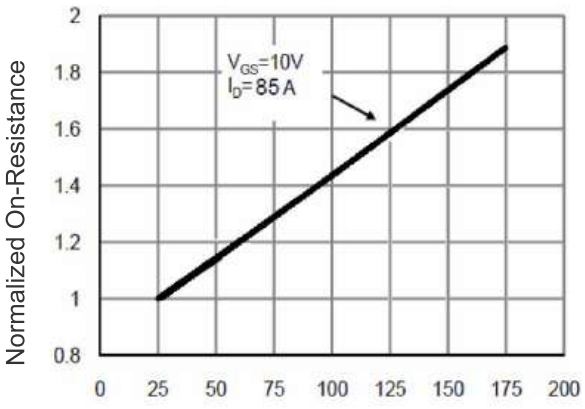
① Repetitive Rating: Pulse width limited by maximum junction temperature.
② Surface Mounted on FR4 Board, t ≤ 10 sec.
③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
④ Guaranteed by design, not subject to production
⑤ EAS condition : T_j=25℃,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics



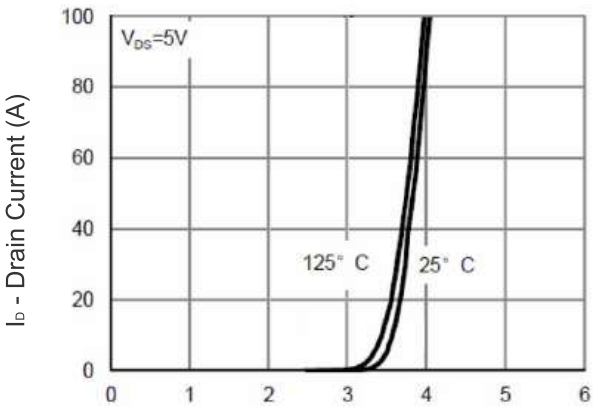
Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



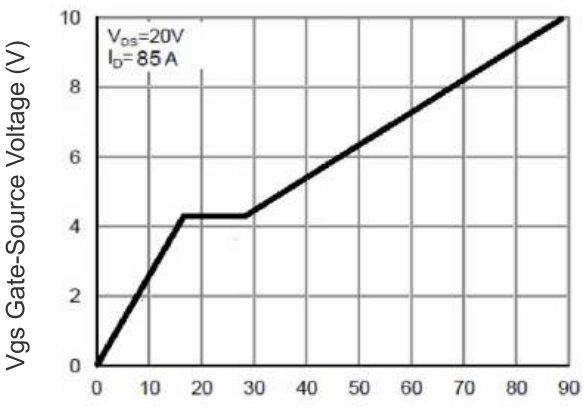
T_J-Junction Temperature (°C)

Figure 4 Rdson-Junction Temperature



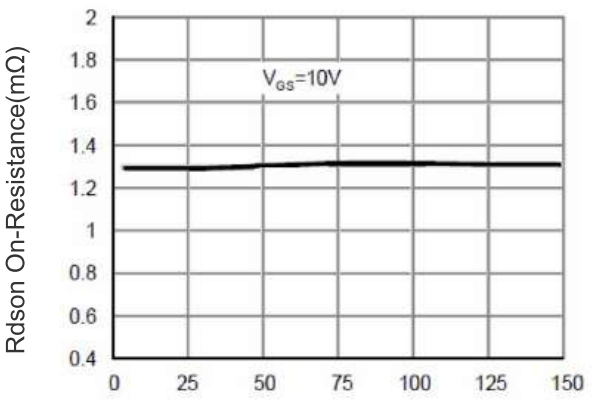
Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



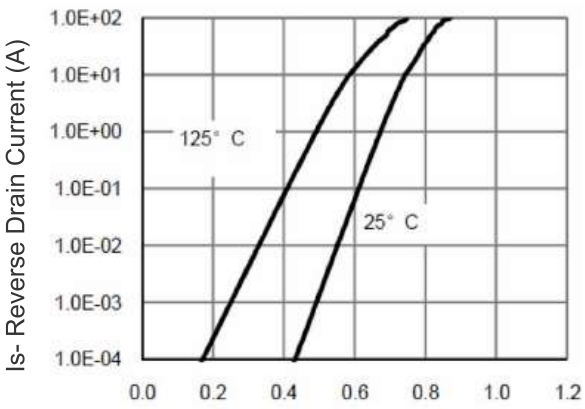
Qg Gate Charge (nC)

Figure 5 Gate Charge



I_D - Drain Current (A)

Figure 3 Rdson- Drain Current



Vsd Source-Drain Voltage (V)

Figure 6 Source- Drain Diode Forward

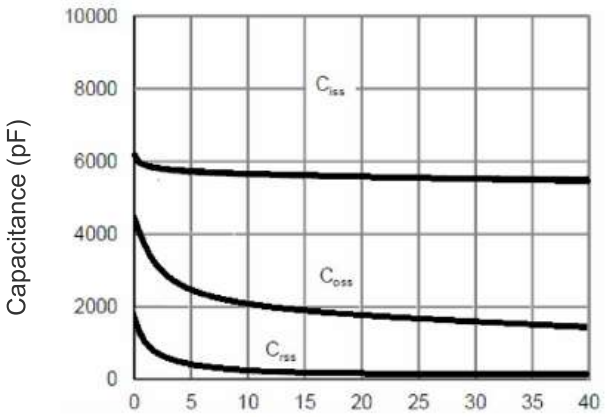


Figure 7 Capacitance vs Vds

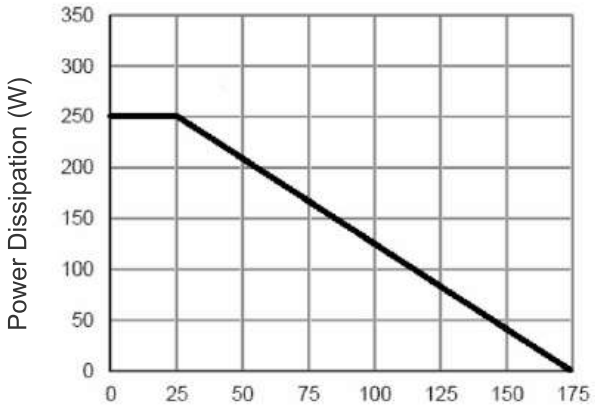


Figure 9 Power De-rating

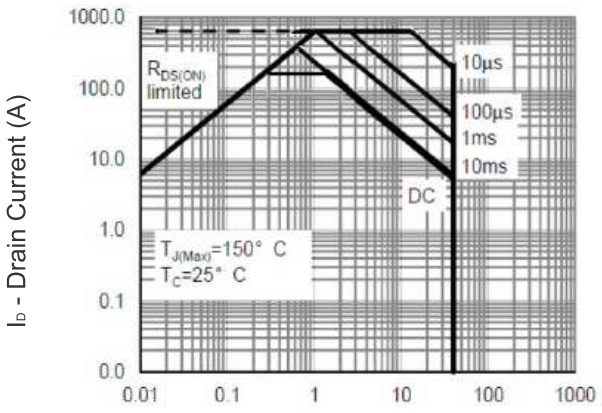


Figure 8 Safe Operation Area

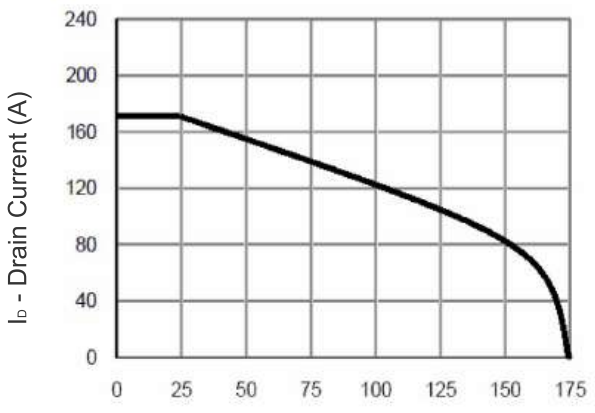


Figure 10 Current De-rating

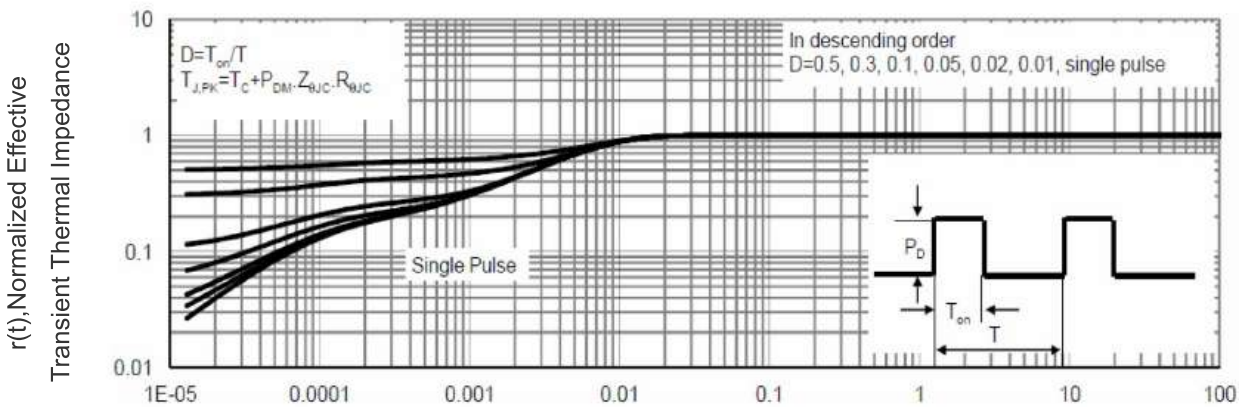
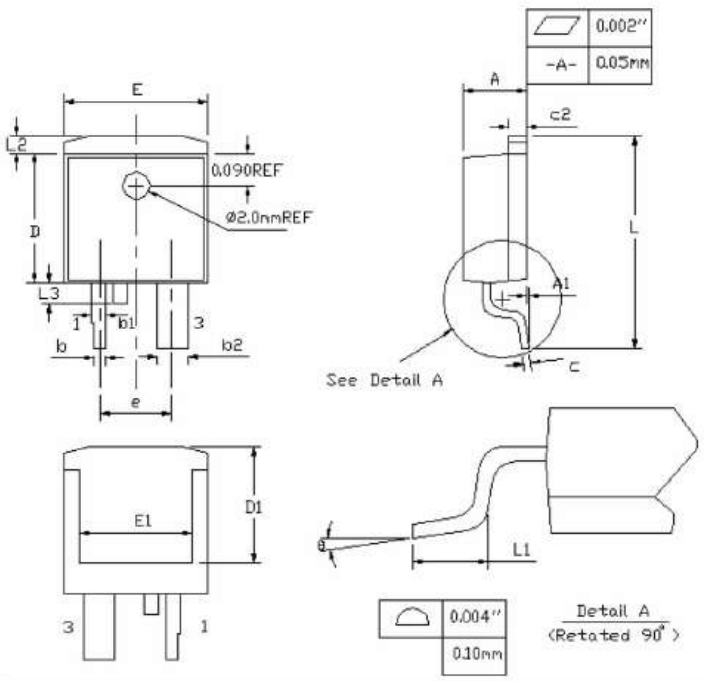


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-263T-2L Package Information



Symbol	Dimensions In Inches		Dimensions In Millimeters	
	Min.	Max.	Min.	Max.
A	0.170	0.180	4.32	4.57
A1	-	0.010	-	0.25
b	0.028	0.037	0.71	0.94
b 1	0.035	0.047	0.9	1.2
b2	0.081	0.095	2.05	2.4
c	0.018	0.024	0.46	0.61
c2	0.048	0.055	1.22	1.40
D	0.350	0.370	8.89	9.40
D1	0.315	0.324	8.01	8.23
E	0.395	0.405	10.04	10.28
E1	0.310	0.318	7.88	8.08
e	0.200 BSC.		5.08 BSC.	
L	0.580	0.620	14.73	15.75
L1	0.090	0.110	2.29	2.79
L2	0.045	0.055	1.15	1.39
L3	0.050	0.070	1.27	1.77
θ	0°	8°	0°	8°

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