ALR039N10S-Q1

N-Channel Super Trench Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
100V	3.9mΩ@10V	160A

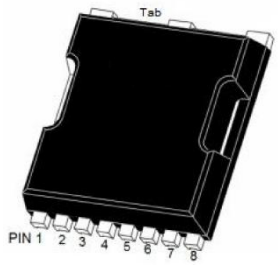
Feature

- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Suffix "-Q1" for AEC-Q101

Application

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

Package



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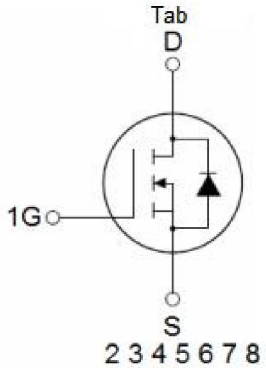
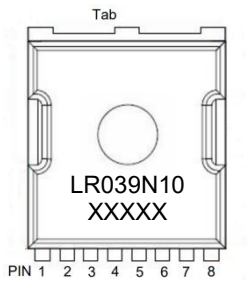
Circuit diagram



Marking



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Absolute maximum ratings (Tc=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	160	A
Continuous Drain Current (T_C =100℃)	I_D	128	A
Pulsed Drain Current	I_{DM}	640	A
Power Dissipation	P_D	260	W
Thermal Resistance,Junction-to-Case[1)]	$R_{\theta JC}$	0.58	℃/W
Single pulse avalanche energy[4)]	E_{AS}	1200	mJ
Junction Temperature	T_J	175	℃
Storage Temperature	T_{STG}	-55 ~ +175	℃

Electrical characteristics (Tc=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	100			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =100V,V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage[2)]	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	2.0	3.3	4.0	V
Drain-source on-resistance[2)]	$R_{DS(on)}$	V_{GS} =10V, I_D =80A		3.3	3.9	mΩ
Dynamic characteristics[3)]						
Input Capacitance	C_{iss}	V_{DS} =50V, V_{GS} =0V, f =1MHz		7500		pF
Output Capacitance	C_{oss}			755		
Reverse Transfer Capacitance	C_{rss}			45		
Total Gate Charge	Q_g	V_{DS} =50V, V_{GS} =10V, I_D =80A		100		nC
Gate-Source Charge	Q_{gs}			43.4		
Gate-Drain Charge	Q_{gd}			19.7		
Turn-on delay time	$t_{d(on)}$	V_{DD}=50V, V_{GS}=10V, I_D=80A, R_G=4.7Ω		20		nS
Turn-on rise time	t_r			78		
Turn-off delay time	$t_{d(off)}$			50		
Turn-off fall time	t_f			16		
Source-Drain Diode characteristics						
Diode Forward Current[1)]	I_S				160	A
Diode Forward voltage[2)]	V_{SD}	V_{GS} =0V, I_S=160A			1.2	V
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =I_S di/dt = 100A/μs [2)]		65		nS
Reverse Recovery Charge	Q_{rr}			144		nC

Notes:

1) Surface Mounted on FR4 Board by JEDEC . Continuous current at TC=25℃ is silicon limited

2) Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

3) Guaranteed by design, not subject to production testing.

4) EAS condition : Tj=25℃ ,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω

Typical Characteristics

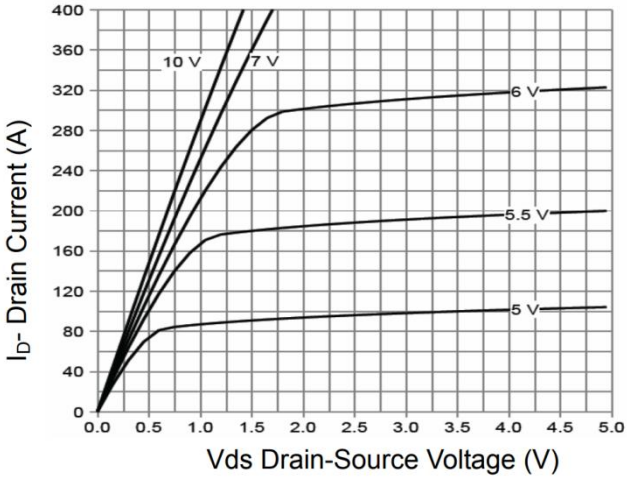


Figure 1 Output Characteristics

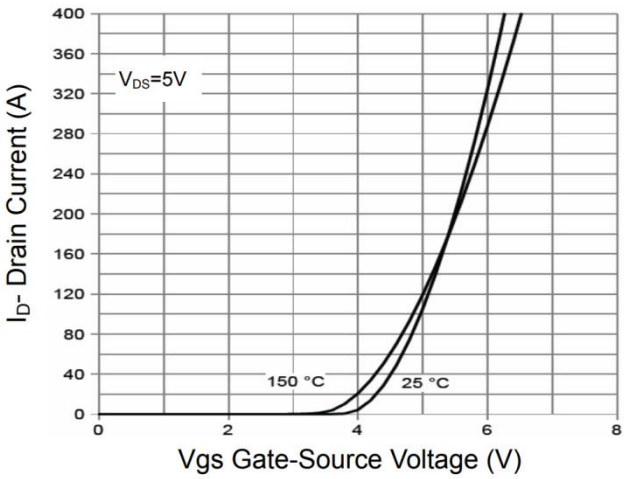


Figure 2 Transfer Characteristics

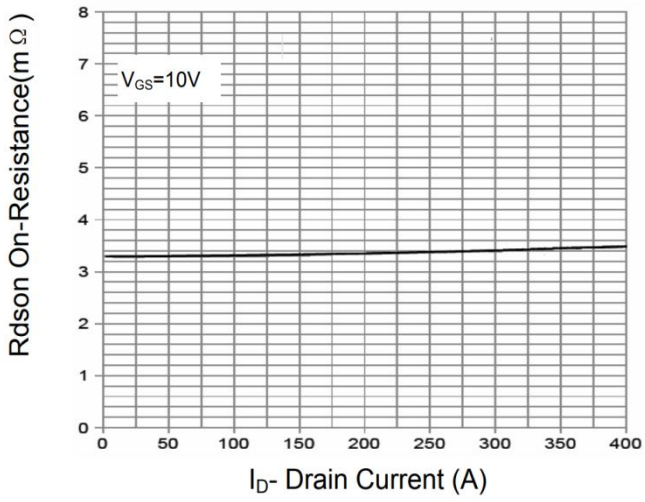


Figure 3 Rdson- Drain Current

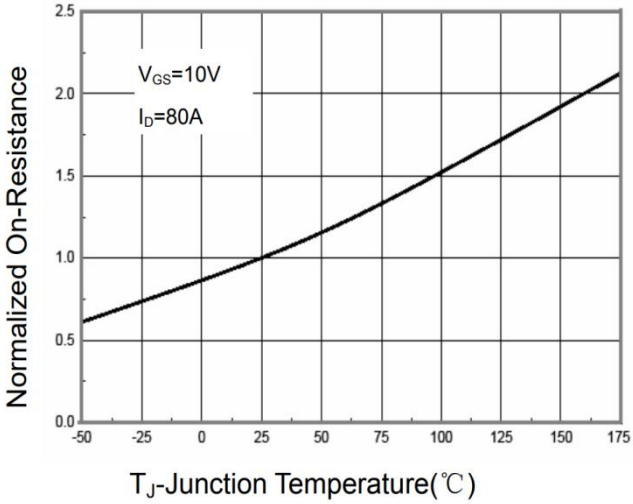


Figure 4 Rdson-JunctionTemperature

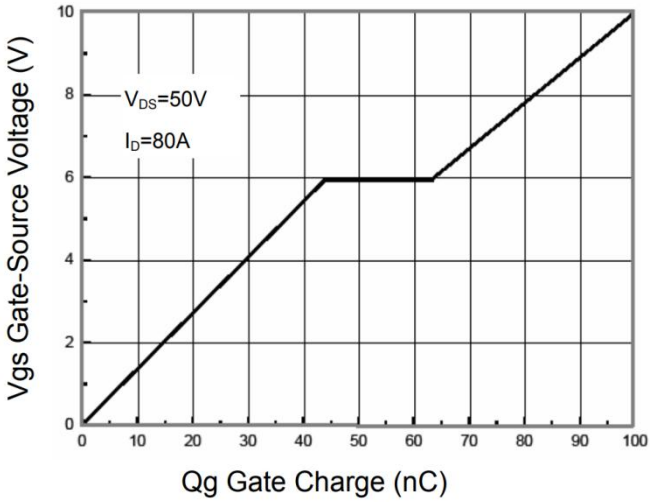


Figure 5 Gate Charge

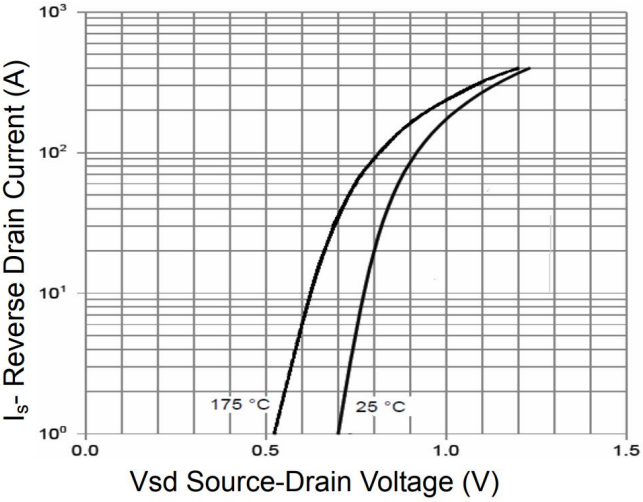


Figure 6 Source- Drain Diode Forward

Typical Characteristics

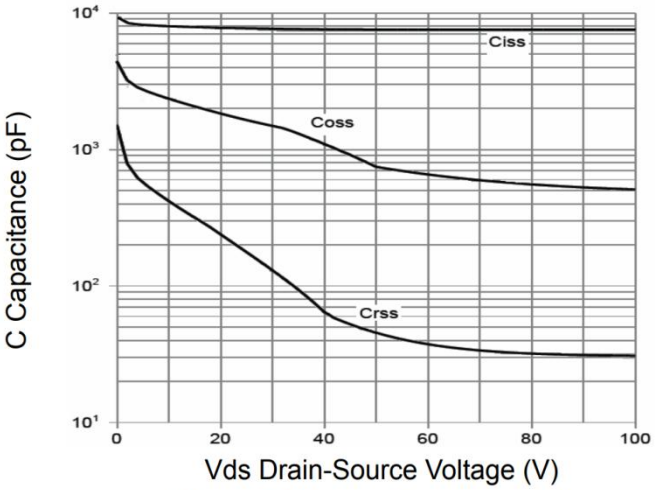


Figure 7 Capacitance vs Vds

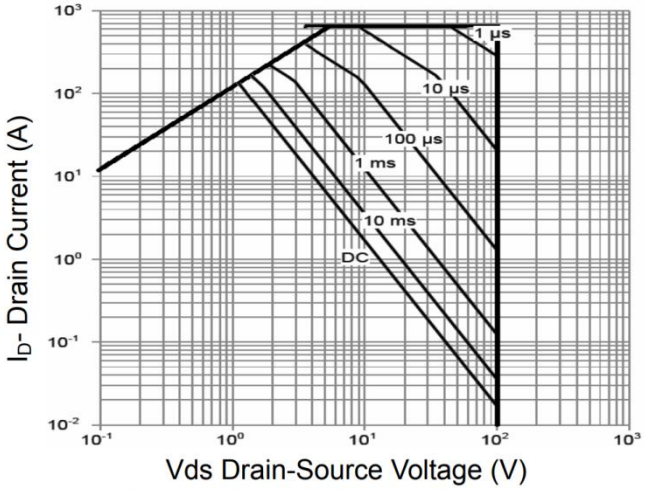


Figure 8 Safe Operation Area

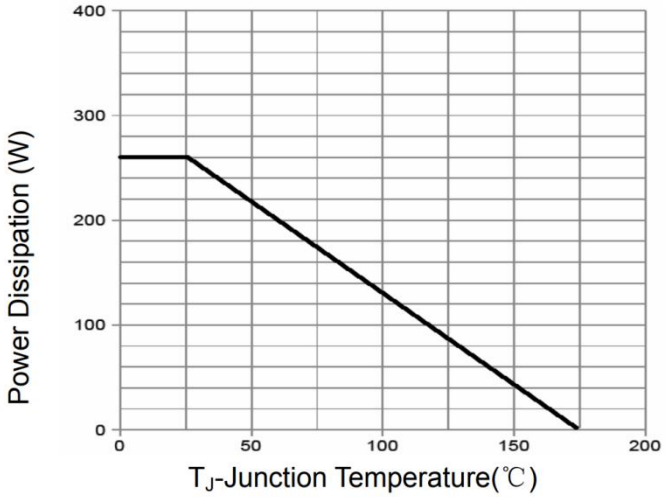


Figure 9 Power De-rating

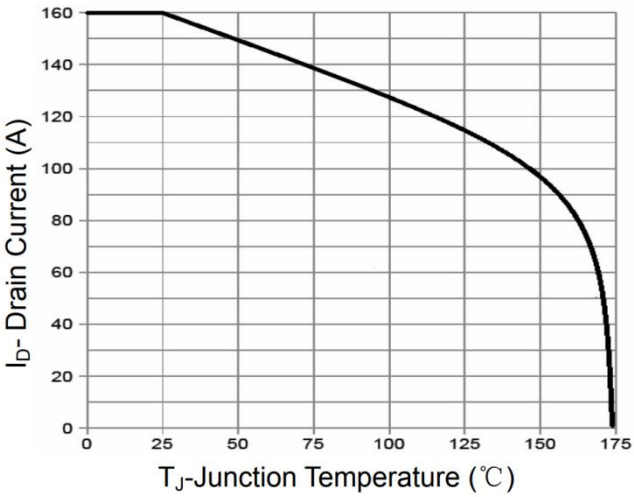


Figure 10 Current De-rating

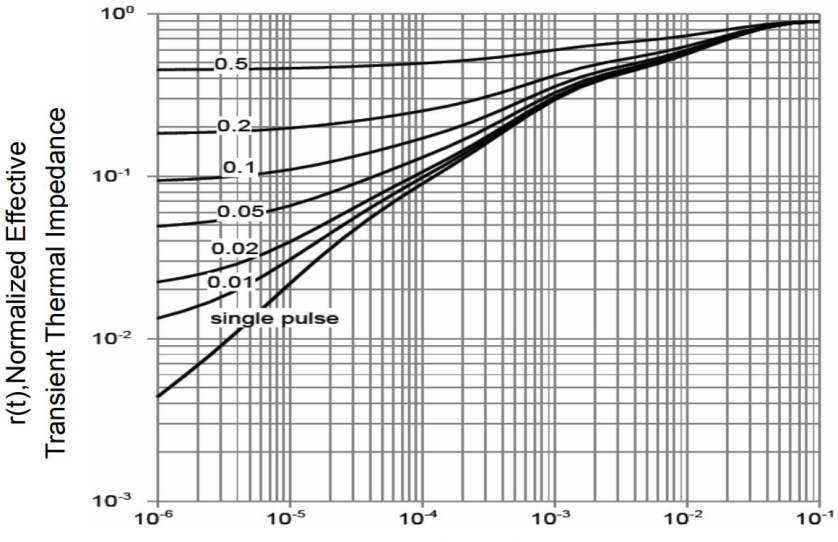
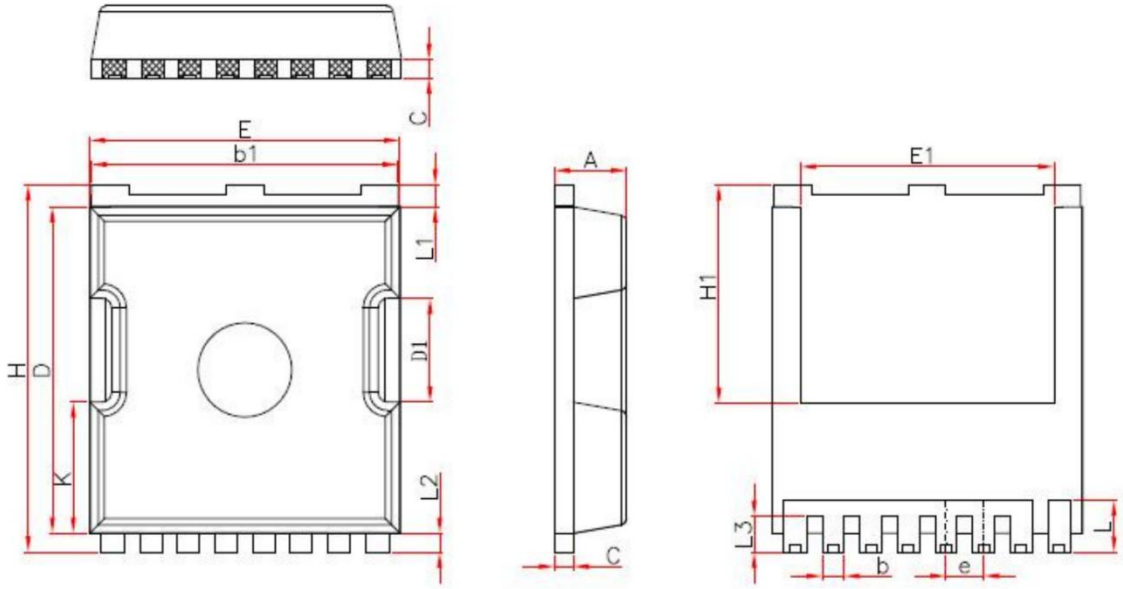


Figure 11 Normalized Maximum Transient Thermal Impedance

TOLL Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
b	0.650	0.850	0.026	0.033
b1	9.700	9.900	0.382	0.390
C	0.500	0.700	0.020	0.027
D	10.300	10.500	0.406	0.413
D1	3.150	3.450	0.124	0.136
E	9.700	10.100	0.382	0.398
E1	8.000	8.200	0.315	0.323
e	1.100	1.300	0.043	0.051
H	11.600	11.800	0.457	0.465
H1	6.850	7.050	0.270	0.278
K	4.080	4.280	0.161	0.169
L	1.600	2.100	0.063	0.083
L1	0.600	0.800	0.024	0.031
L2	0.500	0.700	0.020	0.028
L3	1.050	1.300	0.041	0.051