ALR014N04S-Q1

N-Channel Enhancement Mode Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
40V	1.4mΩ@10V	210A
	1.9mΩ@4.5V	

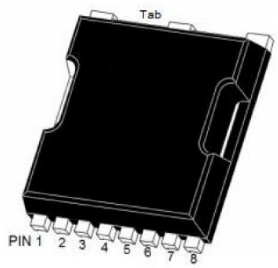
Feature

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Suffix "-Q1" for AEC-Q101

Application

- DC/DC Converter
- Power switching application
- Uninterruptible power supply

Package



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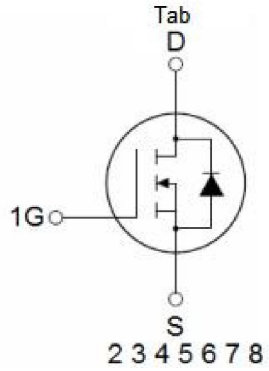
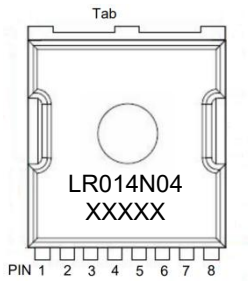
Circuit diagram



Marking



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N-Channel Enhancement Mode Power MOSFET

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (T_C=25℃)[1,2]	I_D	210	A
Continuous Drain Current (T_C=100℃)[1,2]	I_D(100℃)	132	A
Pulsed Drain Current (T_C=25℃,t_p=100μs)	I_{DM}	840	A
Power Dissipation (T_C=25℃)[1,2]	P_D	113	W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.1	℃/W
Single pulse avalanche Energy[4]	E_{AS}	600.25	mJ
Junction Temperature	T_J	150	℃
Storage Temperature Range	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=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	40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =40V,V_{GS} =0V			1	μA
		V_{DS} =40V,V_{GS} =0V,T_J =150℃			100	
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1.3	1.8	2.3	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =50A		1.0	1.4	mΩ
		V_{GS} =4.5V, I_D =25A		1.4	1.9	
Dynamic characteristics[3]						
Input Capacitance	C_{iss}	V_{DS} =20V,V_{GS} =0V, f =1MHz		6140		pF
Output Capacitance	C_{oss}			1860		
Reverse Transfer Capacitance	C_{rss}			75		
Total Gate Charge	Q_g	V_{DS} =20V,V_{GS} =10V, I_D =50A		89		nC
Gate-Source Charge	Q_{gs}			18		
Gate-Drain Charge	Q_{gd}			15		
Gate Resistance	R_g	f =1MHz		3.3		Ω
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V,V_{GS}=10V, I_D=50A,R_{GEN}=3Ω		14		nS
Turn-on rise time	t_r			15		
Turn-off delay time	$t_{d(off)}$			84		
Turn-off fall time	t_f			44		
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	V_{GS} =0V,I_S=50A			1.2	V
Diode Forward Current	I_S				210	A
Reverse Recovery Time	t_{rr}	I_F=50A ,di/dt = 100A/μs		55		nS
Reverse Recovery Charge	Q_{rr}			53		nC

Notes:

1) The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

2) Thermal resistance from junction to soldering point (on the exposed drain pad).

3) Guaranteed by design, not subject to production.

4) V_G=10V, R_G=25Ω, L=0.5mH, IAS=49A

Typical Characteristics

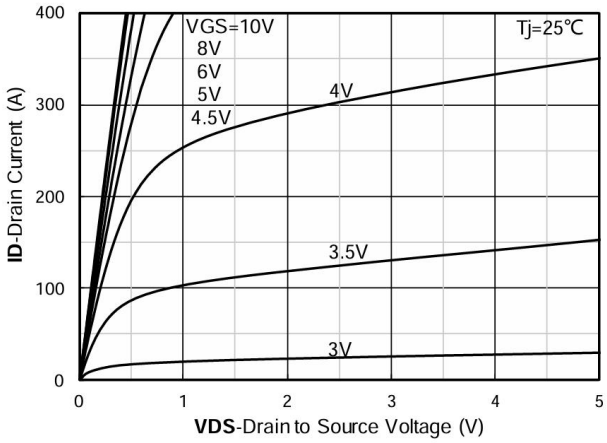


Figure 1. Output Characteristics

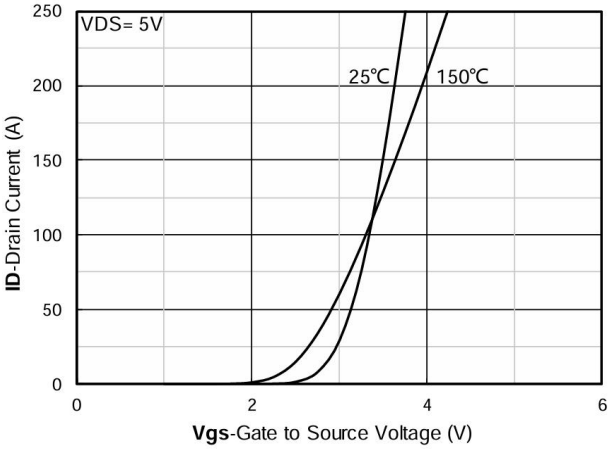


Figure 2. Transfer Characteristics

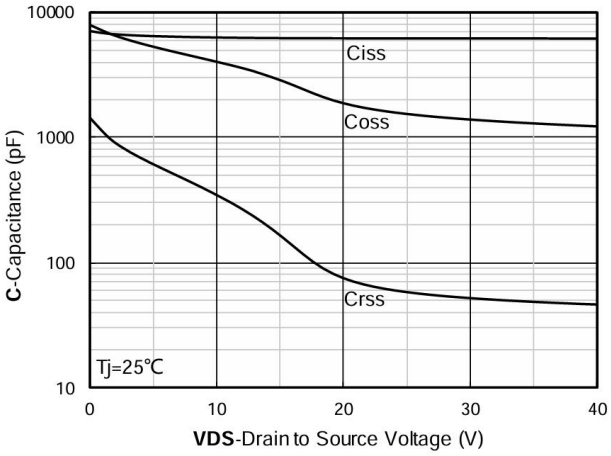


Figure 3. Capacitance Characteristics

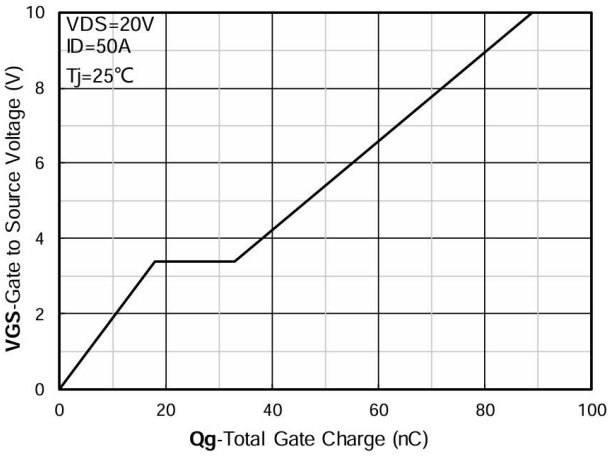


Figure 4. Gate Charge

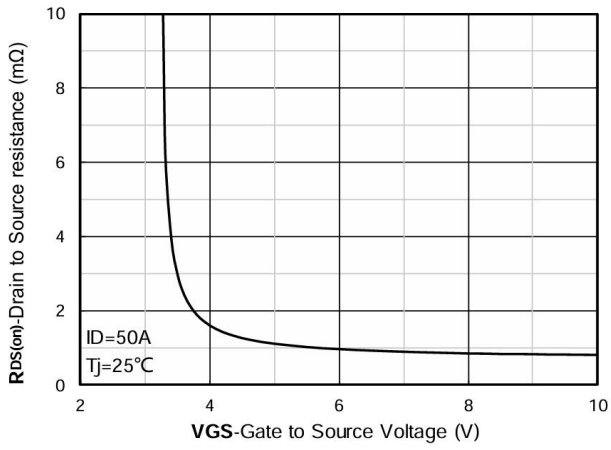


Figure 5. On-Resistance vs Gate to Source Voltage

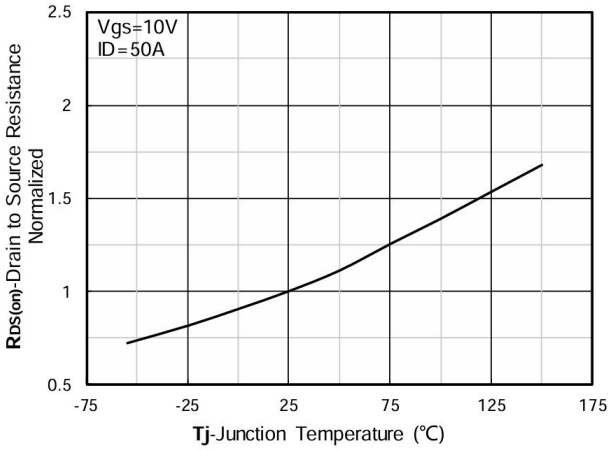


Figure 6. Normalized On-Resistance

Typical Characteristics

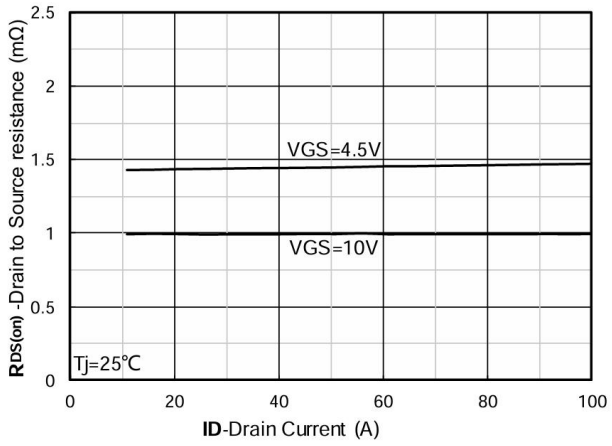


Figure 7. $R_{DS(on)}$ VS Drain Current

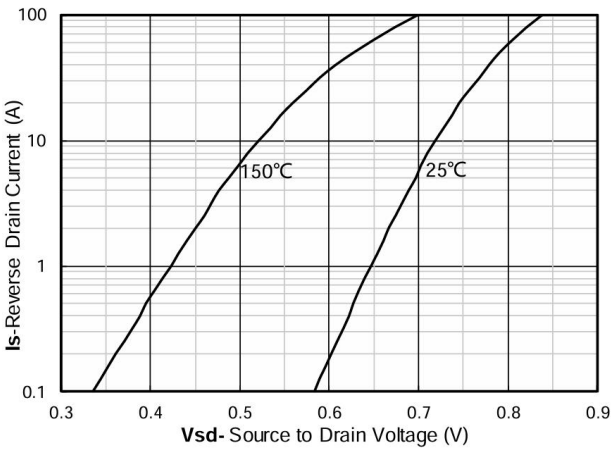


Figure 8. Forward characteristics of reverse diode

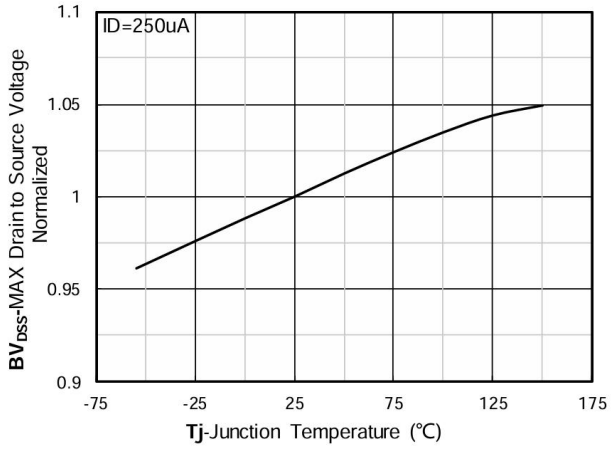


Figure 9. Normalized breakdown voltage

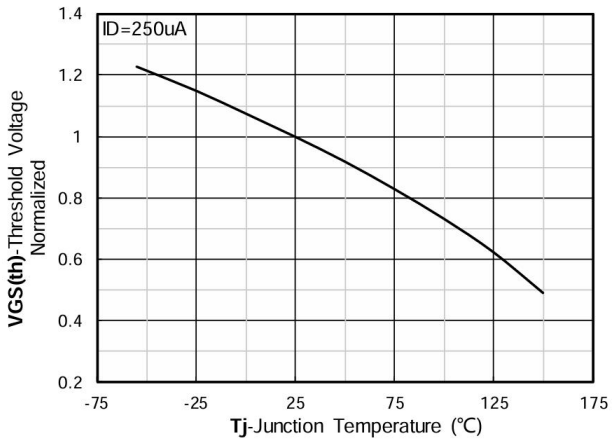


Figure 10. Normalized Threshold voltage

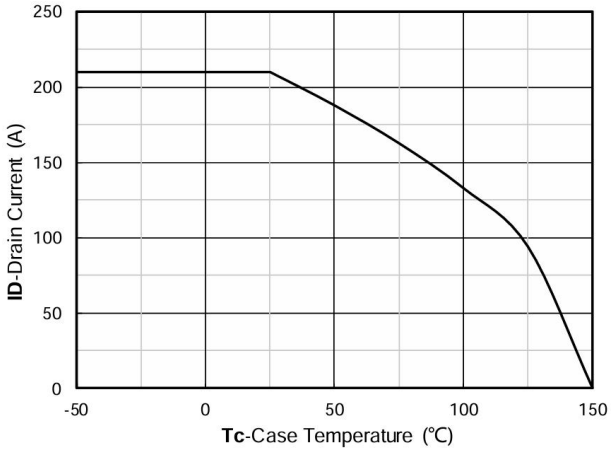


Figure 11. Current dissipation

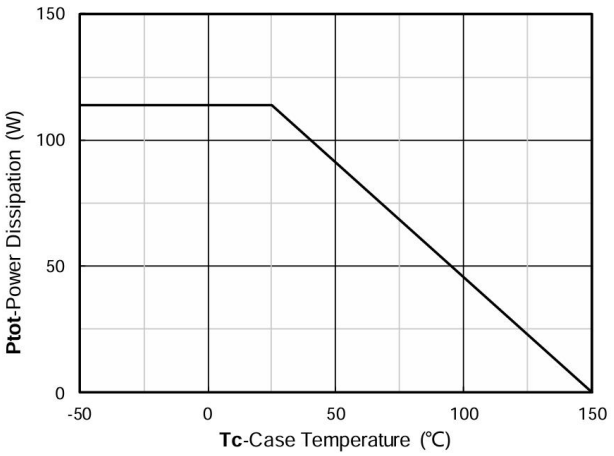


Figure 12. Power dissipation

Typical Characteristics

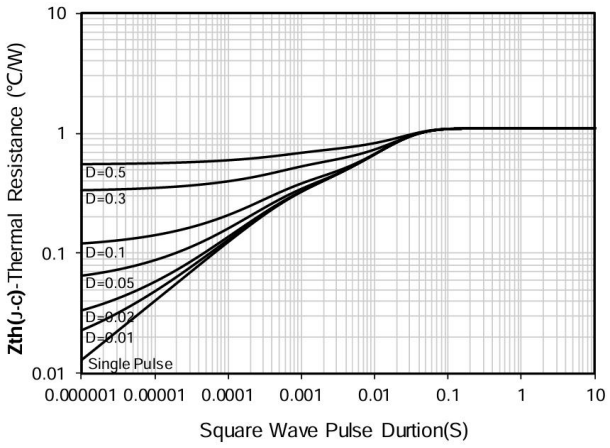


Figure 13. Maximum Transient Thermal Impedance

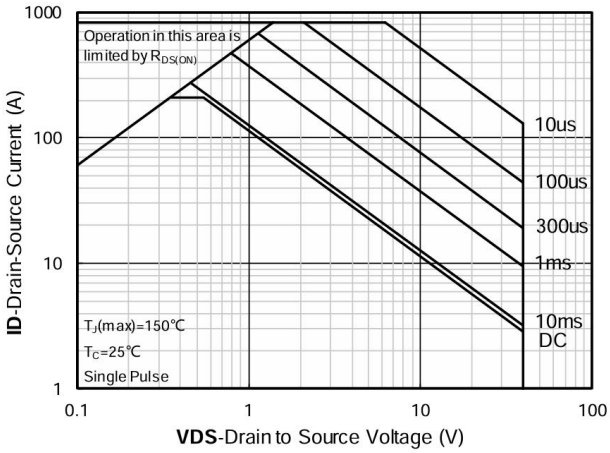
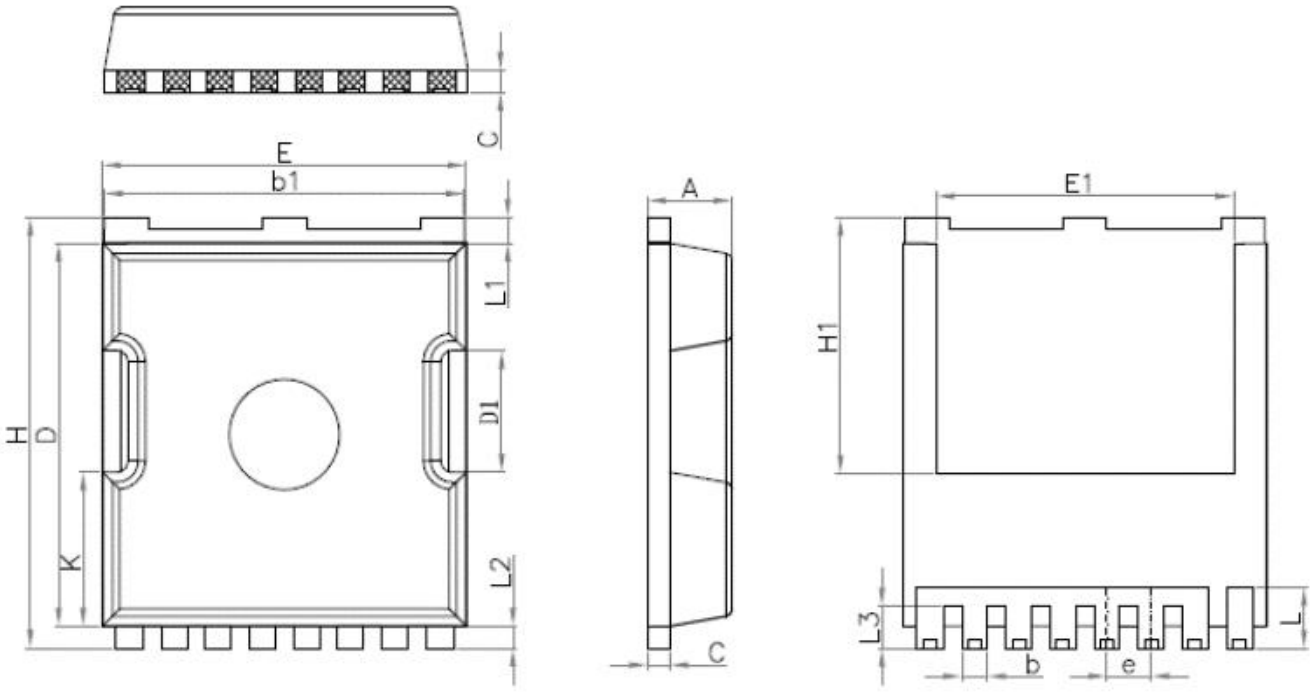


Figure 14. Safe Operation Area

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	0.900	0.026	0.035
b1	9.700	9.900	0.382	0.390
C	0.400	0.700	0.016	0.028
D	10.280	10.500	0.405	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	11.580	11.800	0.456	0.465
H1	6.850	7.050	0.270	0.278
K	4.080	4.280	0.161	0.169
L	1.500	2.100	0.059	0.083
L1	0.600	0.800	0.024	0.031
L2	0.500	0.700	0.020	0.028
L3	1.050	1.400	0.041	0.055