AT90N15S-Q1

N-Channel Enhancement Mode Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
150V	12mΩ@10V	90A

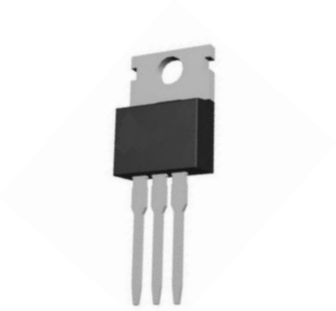
Feature

- 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

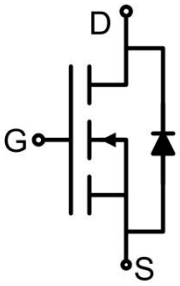
- Consumer electronic power supply
- Isolated DC-DC Converters
- Motor control

Package



TO-220AB

Circuit diagram



Marking

AT90N15S-Q1

N-Channel Enhancement Mode Power MOSFET

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current(T_C=25℃)	I_D	90	A
Drain Current(T_C=100℃)	I_D(100℃)	56	A
Pulsed Drain Current[1]	I_{DM}	250	A
Power Dissipation[3]	P_D	3	W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.7	℃/W
Single pulse avalanche energy[2]	E_{AS}	400	mJ
Junction Temperature	T_J	150	℃
Storage Temperature	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	150			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =150V,V_{GS} = 0V			1	μA
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	2.0	3.0	4.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =45A		9.6	12	mΩ
		V_{GS} =10V, I_D =20A		9.5	12	
Dynamic characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =75V,V_{GS} =0V,f =1MHz		3750		pF
Output Capacitance	C_{oss}			290		
Reverse Transfer Capacitance	C_{rss}			6		
Total Gate Charge	Q_g	V_{DS} =75V,V_{GS} =10V,I_D =45A		48		nC
Gate-Source Charge	Q_{gs}			15		
Gate-Drain Charge	Q_{gd}			10		
Turn-on delay time	$t_{d(on)}$	V_{DD}=75V, V_{GS} =10V, I_D =45A,R_{GEN}=2.2Ω		16		nS
Turn-on rise time	t_r			82		
Turn-off delay time	$t_{d(off)}$			30		
Turn-off fall time	t_f			6		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				90	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S=45A			1.2	V

Notes:

1) Repetitive rating; pulse width limited by max. junction temperature.

2) T_J=25℃, V_{DD}=75V, V_G=10V, R_G=25Ω, L=2mH, IAS=20A.

3) P_D is based on max. junction temperature, using junction-case thermal resistance.

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

Typical Characteristics

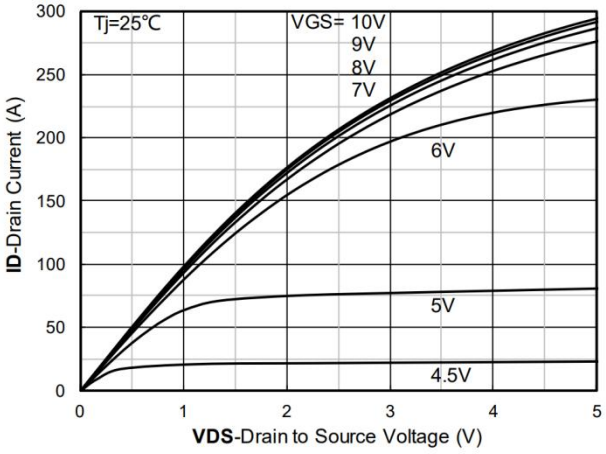


Figure 1. Output Characteristics

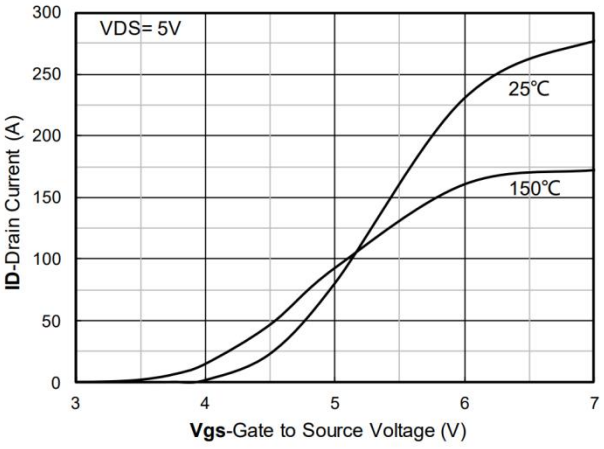


Figure 2. Transfer Characteristics

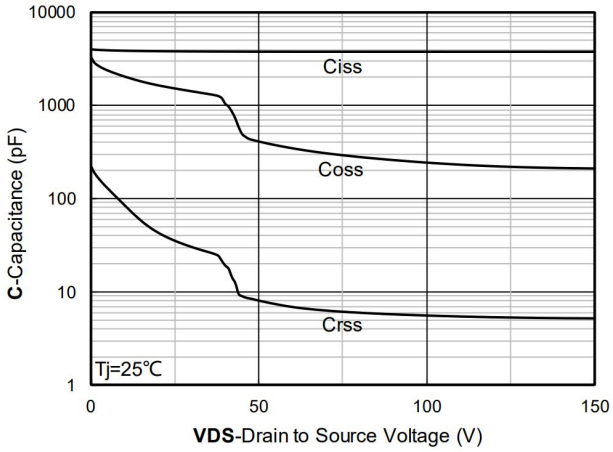


Figure 3. Capacitance Characteristics

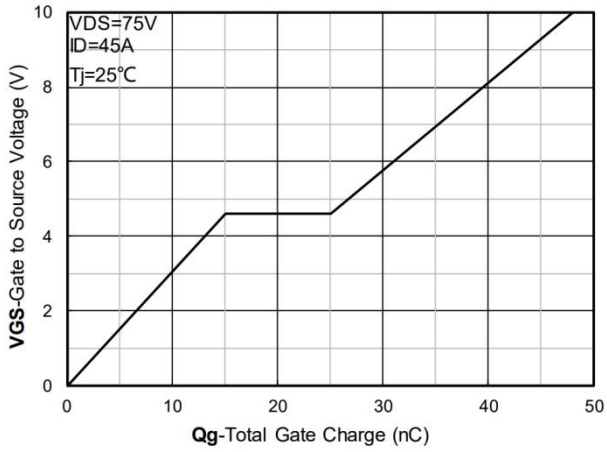


Figure 4. Gate Charge

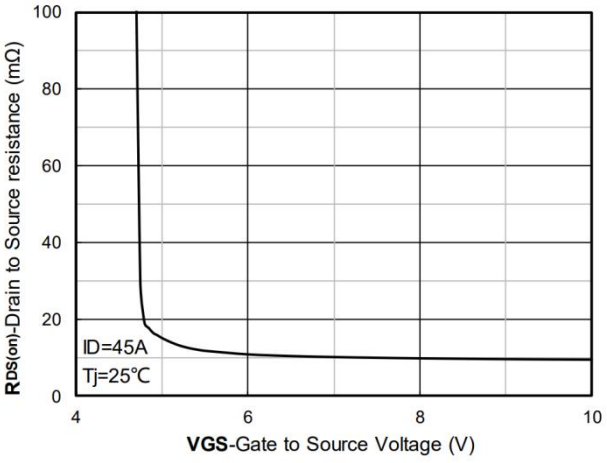


Figure 5. On-Resistance vs Gate to Source Voltage

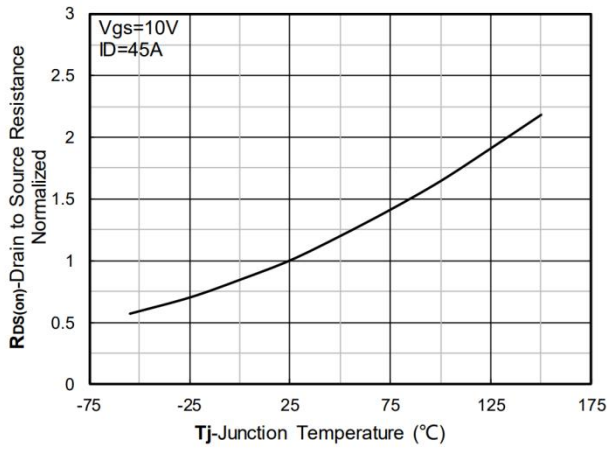


Figure 6. Normalized On-Resistance

Typical Characteristics

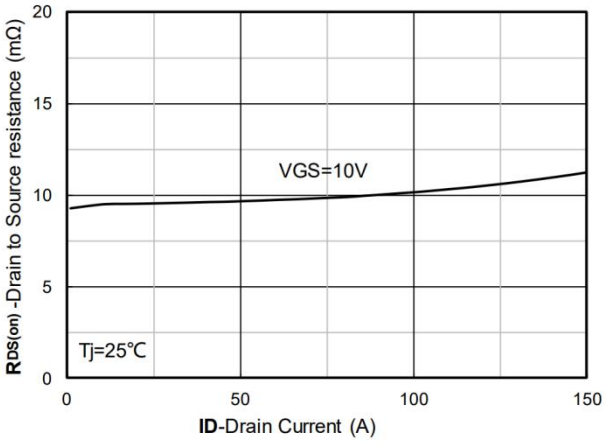


Figure 7. RDS(on) VS Drain Current

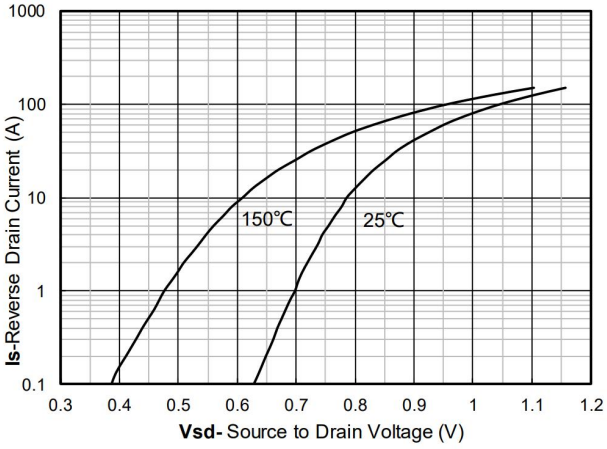


Figure 8. Forward characteristics of reverse diode

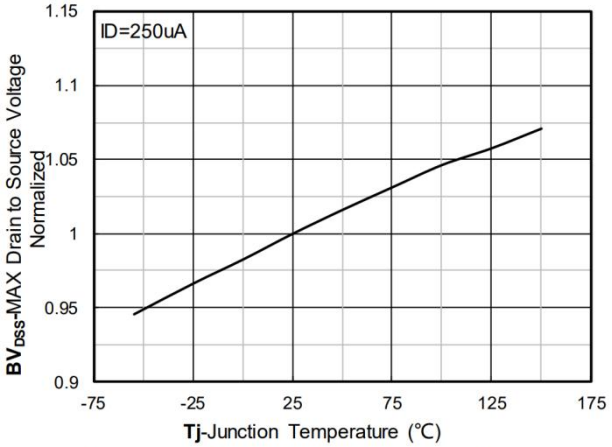


Figure 9. Normalized breakdown voltage

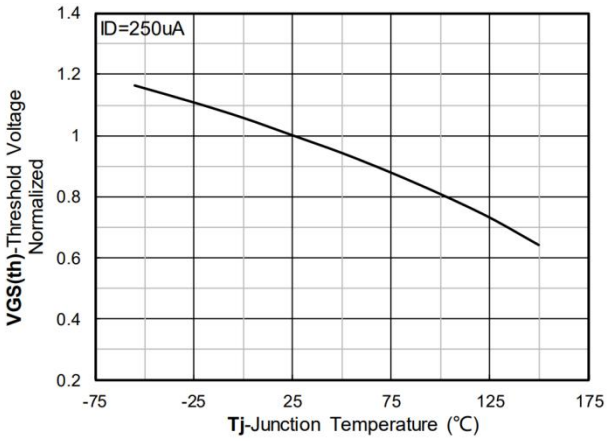


Figure 10. Normalized Threshold voltage

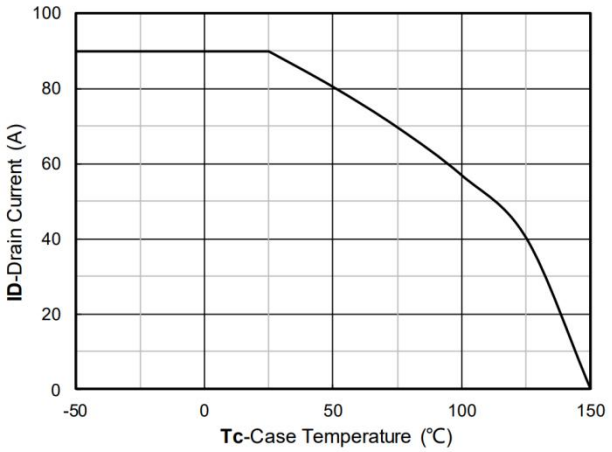


Figure 11. Current dissipation

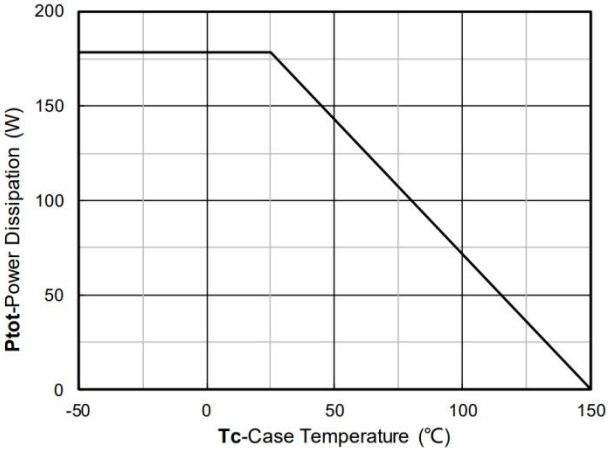


Figure 12. Power dissipation

Typical Characteristics

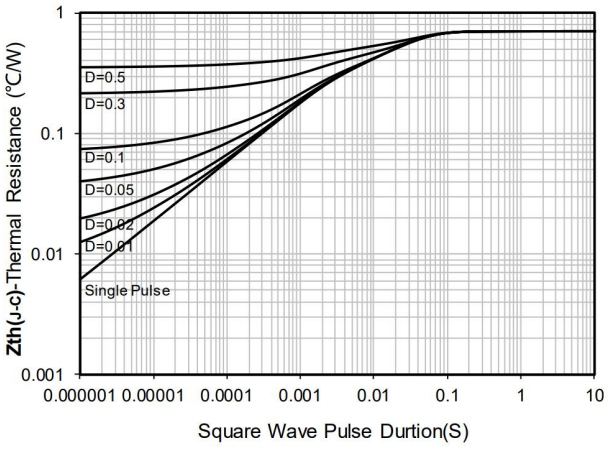


Figure 13. Maximum Transient Thermal Impedance

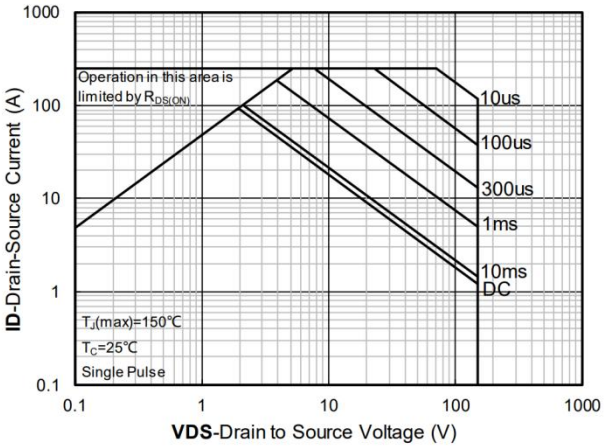
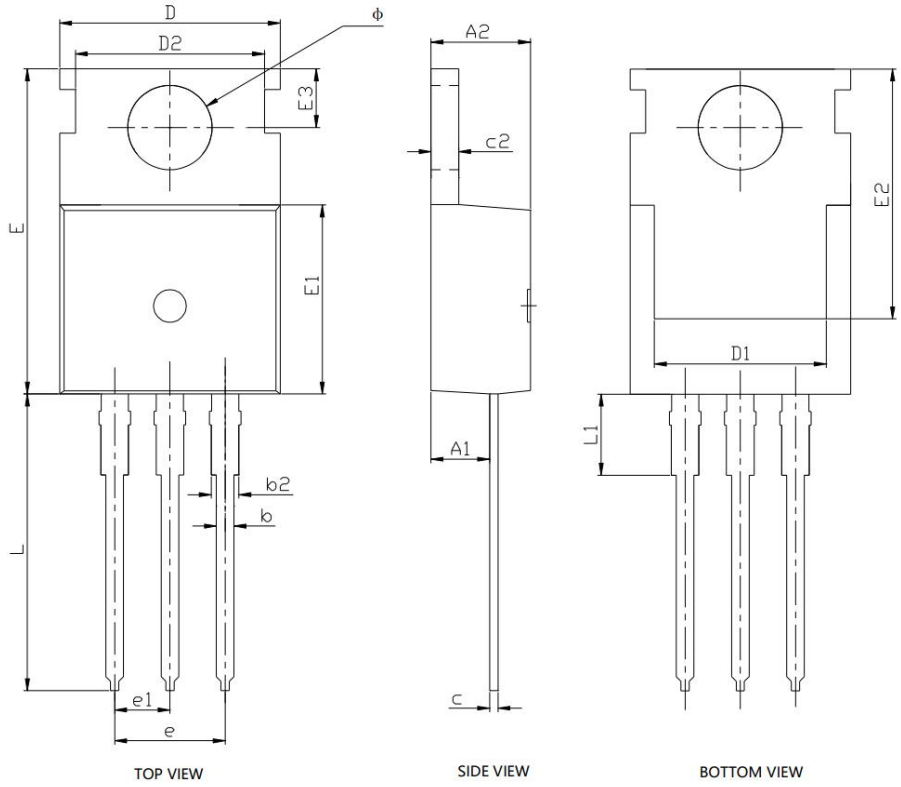


Figure 14. Safe Operation Area

TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A1	2.300	2.500	0.091	0.098
A2	4.400	4.600	0.173	0.181
b	0.700	0.900	0.028	0.035
b2	1.250	1.420	0.049	0.056
c	0.450	0.550	0.018	0.022
c2	1.250	1.350	0.049	0.053
D	9.700	10.200	0.382	0.402
D1	7.500	8.400	0.295	0.331
D2	8.500	8.900	0.335	0.350
E	15.300	16.100	0.602	0.634
E1	9.100	9.300	0.358	0.366
E2	12.630	13.330	0.497	0.525
E3	2.750 BSC		0.108 BSC	
e	5.080 BSC		0.200 BSC	
e1	2.540 BSC		0.100 BSC	
L	13.000	13.500	0.512	0.531
L1	-	3.500	-	0.138
Φ	3.550	3.750	0.140	0.148