

SQA13N90

900V 13A N-Channel Enhancement Mode Power MOSFET

Features

- Typical on-Resistance: $R_{DS(on)}=0.57\Omega$
- High Blocking Voltage
- 100% Avalanche Test
- Good Stability and Uniformity with High E_{AS}

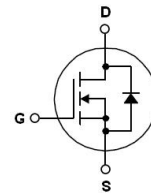
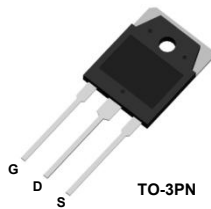
Description

The SQA13N90 is an high blocking voltage N-Channel power MOSFET which using proprietary planar stripe and DMOS technology. This device provide excellent performance for high voltage power supplies or pulse circuits.

Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits

Package Type & Internal Circuit



Absolute Maximum Ratings @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		900	V
V_{GSS}	Gate to Source Voltage		± 30	V
I_D	Drain Current	$T_C=25^\circ\text{C}$	13	A
		$T_C=100^\circ\text{C}$	6.3	A
I_{DM}	Pulsed Drain Current	(Note1)	52	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	300	W
	Derate above 25°C		2.38	W/ $^\circ\text{C}$
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	1100	mJ
T_J	Operating Junction Temperature Range		$-50\sim+150$	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		$-50\sim+150$	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	0.41	$^\circ\text{C/W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ\text{C/W}$

**Electrical Characteristics** @ $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	900	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	3.8	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=6.5A$	-	0.57	1.2	Ω
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=V_{DSS}, V_{GS}=0V$	-	-	10	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0V$	-	-	± 100	nA

D-S Diode Characteristics and Maximum Rating @ $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Maximum Drain to Source Diode Forward Current		-	-	11.0	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=13A$	-	0.85	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=13A,$ $di/dt=-100A/\mu s$	-	1000	-	ns
Q_{rr}	Reverse Recovery Charge		-	20	-	μC

Switching Characteristics @ $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_D=13A,$ $V_{DD}=450V,$ $R_G=25\Omega$ (Note 3)	-	65	140	ns
t_r	Rising Time		-	140	280	ns
$t_{d(off)}$	Turn-off Delay Time		-	140	260	ns
t_f	Falling Time		-	90	190	ns
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V,$ $f=1.0MHz$	-	2750	3300	pF
C_{oss}	Output Capacitance		-	240	310	pF
C_{rss}	Reverse Transfer Capacitance		-	26	32	pF
Q_g	Total Gate Charge	$I_D=13A,$ $V_{DD}=720V$ $V_{GS}=10V$ (Note 3)	-	68	90	nC
Q_{gs}	Gate to Source Charge		-	14	-	nC
Q_{gc}	Gate to Drain Charge		-	26	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. $V_{DD}=10V, L=10mH, V_{clamp}=1100V, V_G=10V, I_D=18.0A$
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Region Characteristics

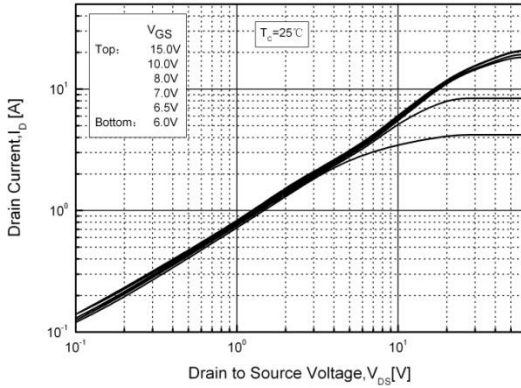


Fig. 2. Typical Transfer Characteristics

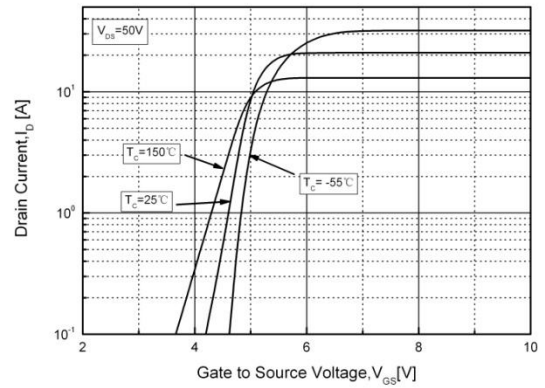


Fig. 3. Static on-Resistance vs. I_D

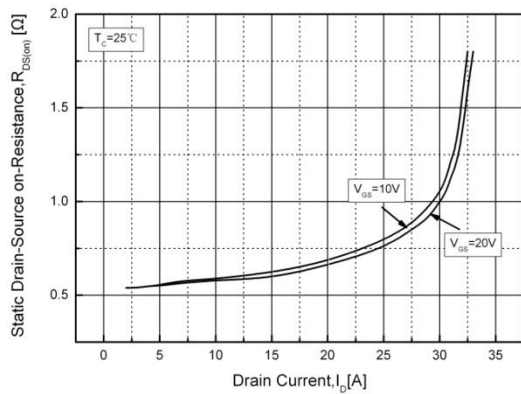


Fig. 4. Body Diode Forward Voltage vs. I_DR

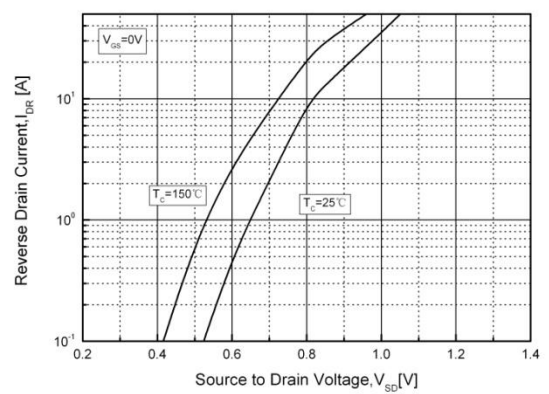


Fig. 5. Capacitance Characteristics

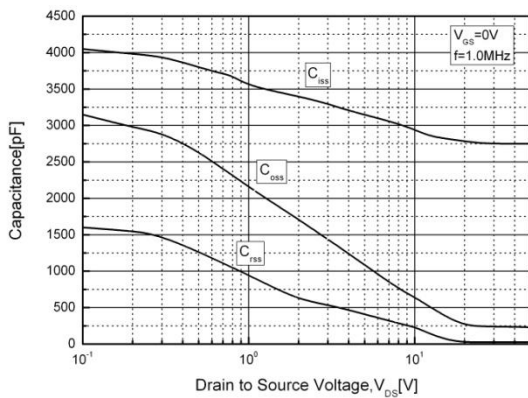
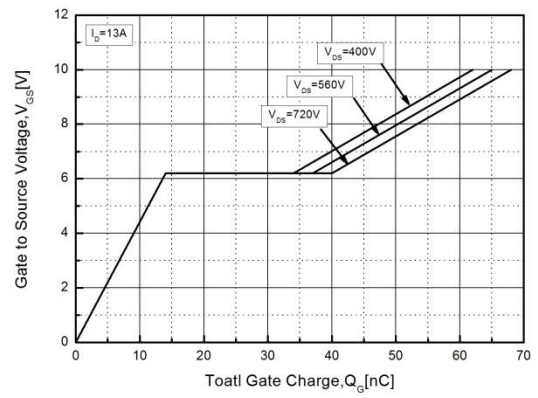


Fig. 6. Gate Charge Characteristics



Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

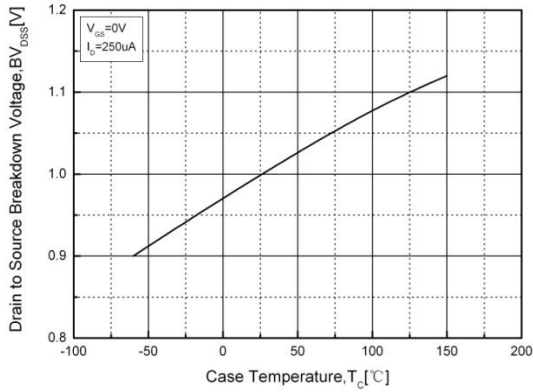


Fig. 8. Static on-Resistance vs. Temperature

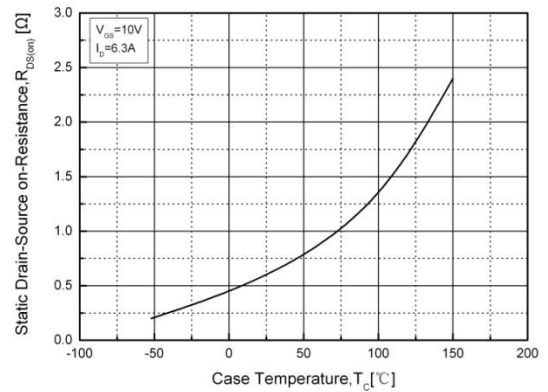


Fig. 9. Maximum Safe Operating Area

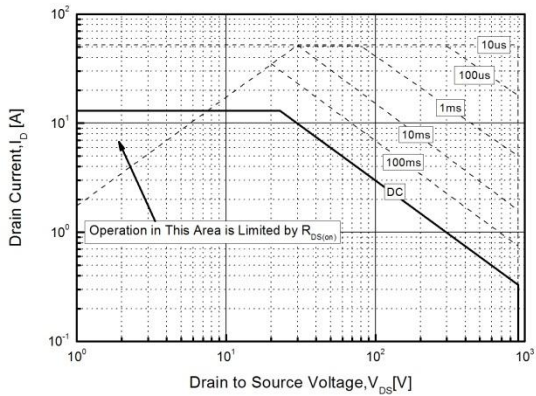


Fig. 10. Maximum Drain Current vs. Temperature

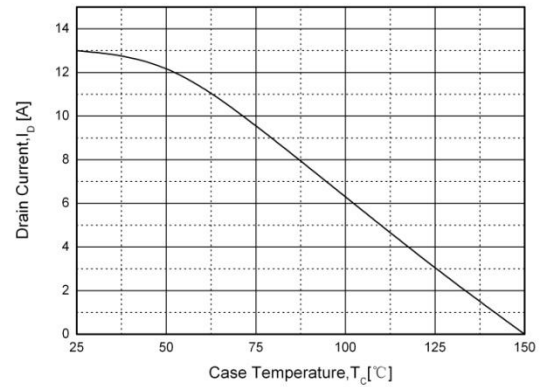
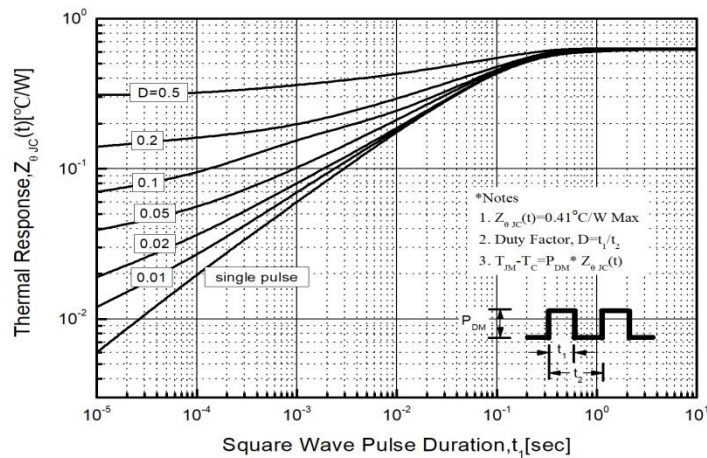


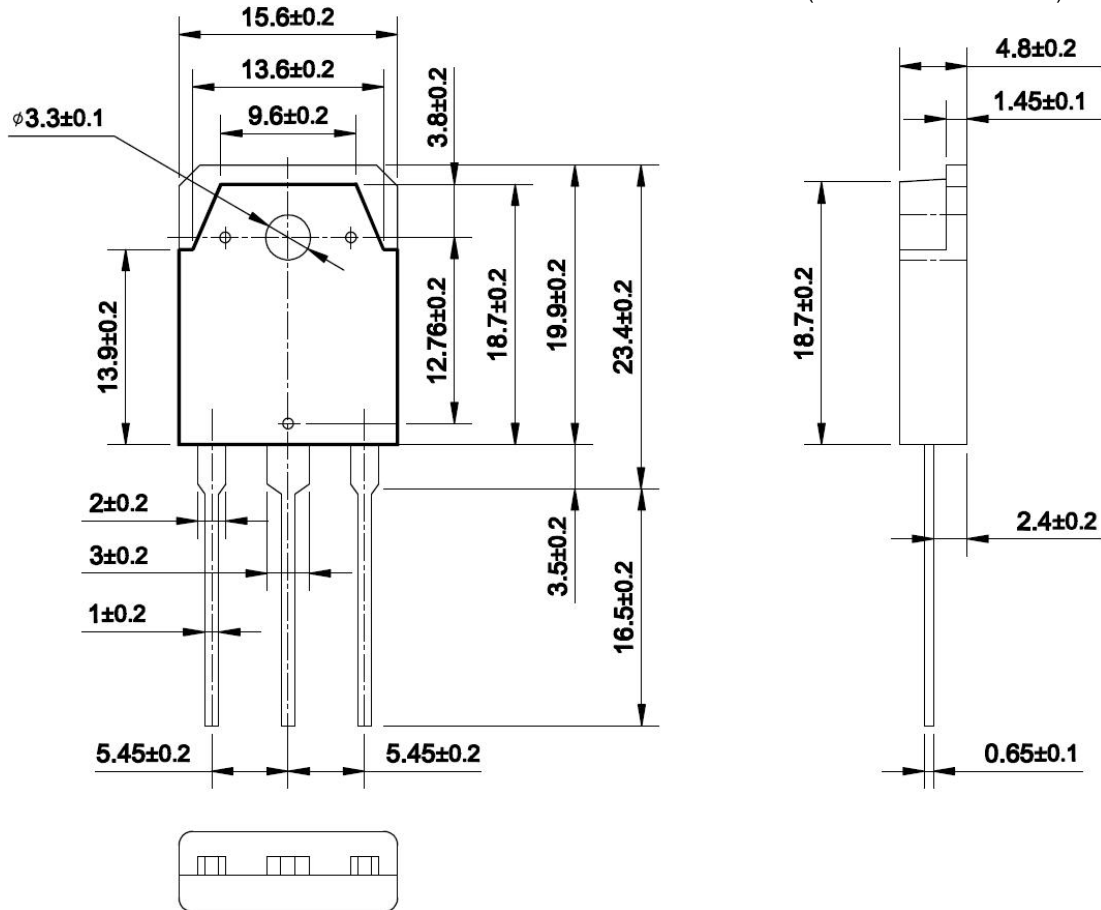
Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-3PN

(Dimensions in Millimeters)



DISCLAIMER:

The products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any product can reasonably be expected to result in a personal injury. Seller's customers using or selling seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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