

SQAK3878

900V 9A N-channel Enhancement Mode Power MOSFET

Features

- Low on-Resistance: $R_{DS(on)}=1.04\ \Omega$ (typ.)
- Special Process Technology for high ESD Capability
- 100% Avalanche Test
- Good Stability and Uniformity with High E_{AS}

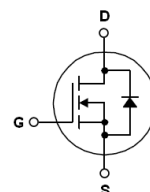
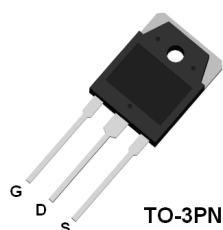
Description

The SQAK3878 is an N-Channel enhancement mode power MOSFET, it has low static on-resistance and high avalanche energy strength. This device provide excellent switching performance for switched mode power supplies, active power factor correction and electronic lamp ballasts.

Applications

- Switched Mode Power Supplies
- Active Power Factor Correction, Electronic Ballasts

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	$T_c=25^\circ\text{C}$	9.0
		$T_c=100^\circ\text{C}$	5.7
I_{DM}	Pulsed Drain Current (Note1)	36	A
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	280
	Derate above 25°C	2.22	W/ $^\circ\text{C}$
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	710	mJ
T_J	Operating Junction Temperature Range	$-55\sim+150$	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	$-55\sim+150$	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	0.45	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ\text{C}/\text{W}$

Electrical Characteristics @T_c=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	900	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.0	3.0	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =4.5A	-	1.04	1.4	Ω
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =V _{DSS} , V _{GS} =0V	-	-	10	uA
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 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Maximum Drain to Source Diode Forward Current		-	-	9.0	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =9A	-	-	1.4	V
T _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =9A,	-	550	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=-100A/us	-	6.5	-	nC

Switching Characteristics @T_c=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on Delay Time	I _D =11A, V _{DD} =450V, R _G =25 Ω (Note 3)	-	40	110	ns
t _r	Turn-on Rise Time		-	120	250	ns
t _{d(off)}	Turn-off Delay Time		-	100	210	ns
t _f	Turn-off Fall Time		-	75	160	ns
C _{ies}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1.0MHz	-	2100	-	pF
C _{oes}	Output Capacitance		-	175	-	pF
C _{rss}	Reverse Transfer Capacitance		-	14	-	pF
Q _g	Total Gate Charge	I _D =11A, V _{DD} =720V V _{GS} =10V (Note 3)	-	45	58	nC
Q _{ge}	Gate to Emitter Charge		-	13	-	nC
Q _{gc}	Gate to Collector Charge		-	18	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. V_{DD}=50V, L=30mH, R_G=25 Ω, V_G=10V, I_{AS}=7A, stating T_J=25°C
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Resistance Characteristics

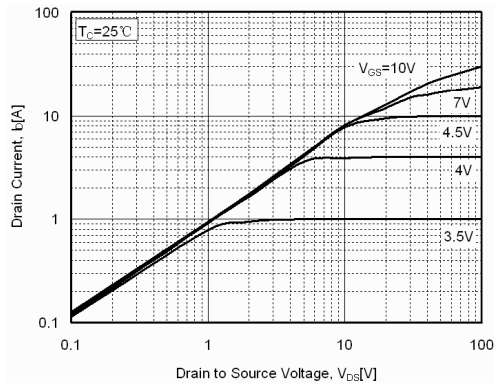


Fig. 2. Typical Transfer Characteristics

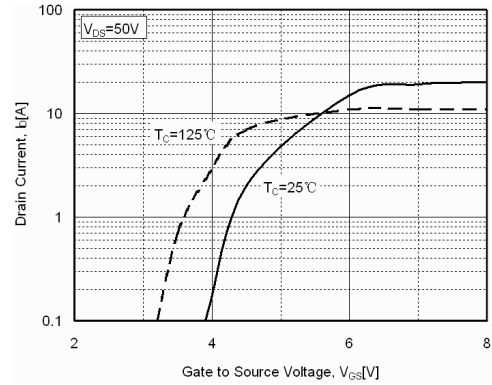


Fig. 3. Static on-Resistance vs. I_D

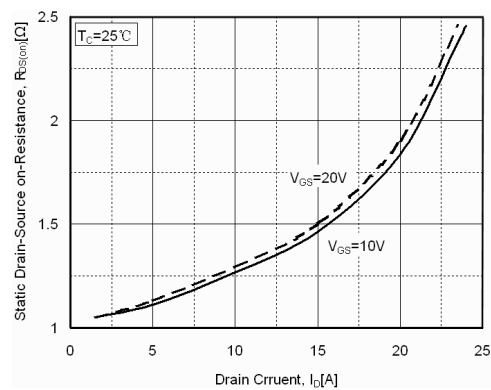


Fig. 4. Body Diode Forward Voltage vs. I_DR

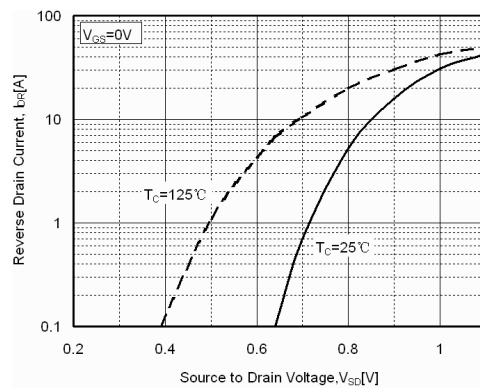


Fig. 5. Capacitance Characteristics

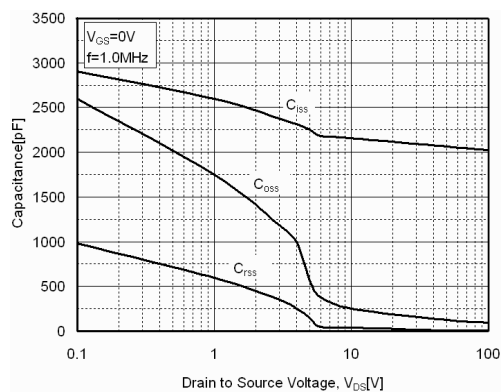
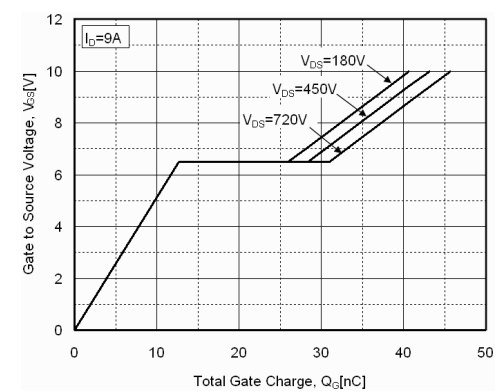


Fig. 6. Gate Charge Characteristics



Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

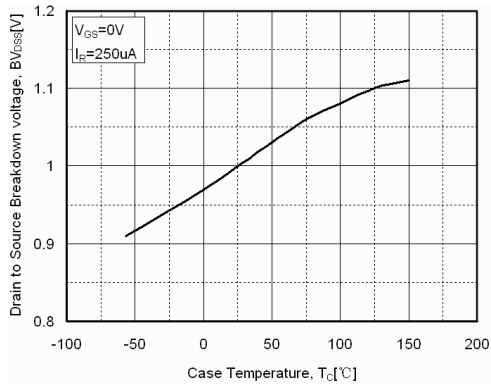


Fig. 8. Static on-Resistance vs. Temperature

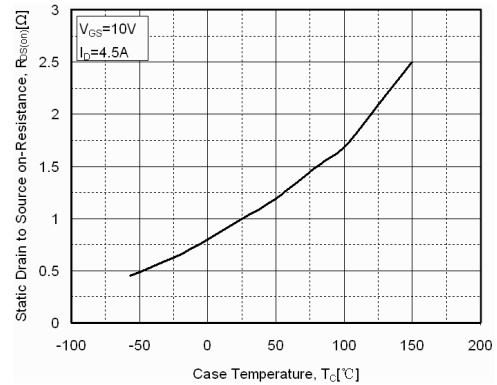


Fig. 9. Maximum Safe Operating Area

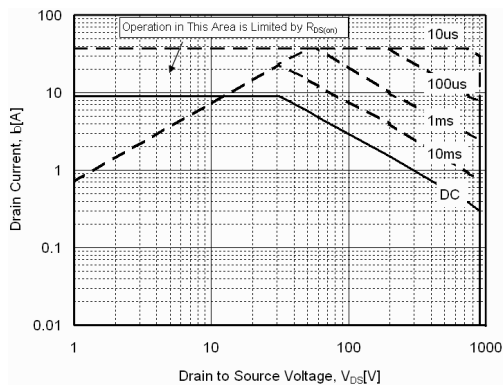


Fig. 10. Maximum Drain Current vs. Temperature

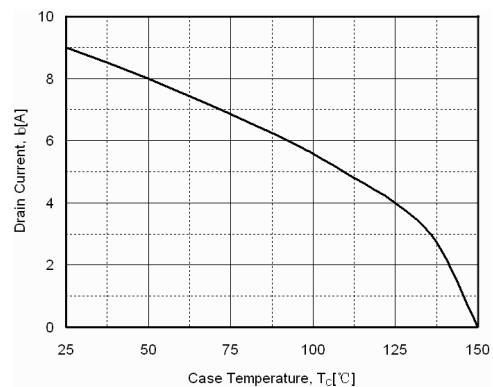
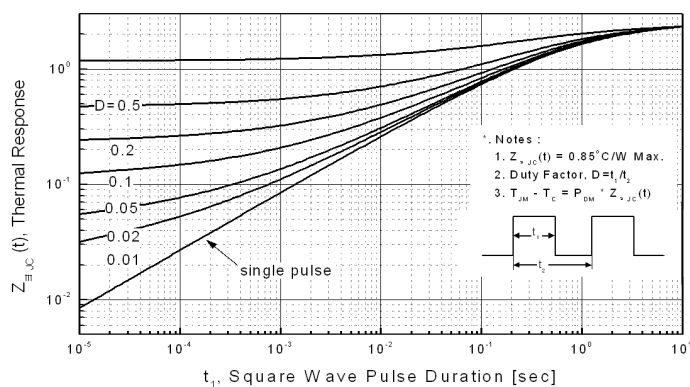


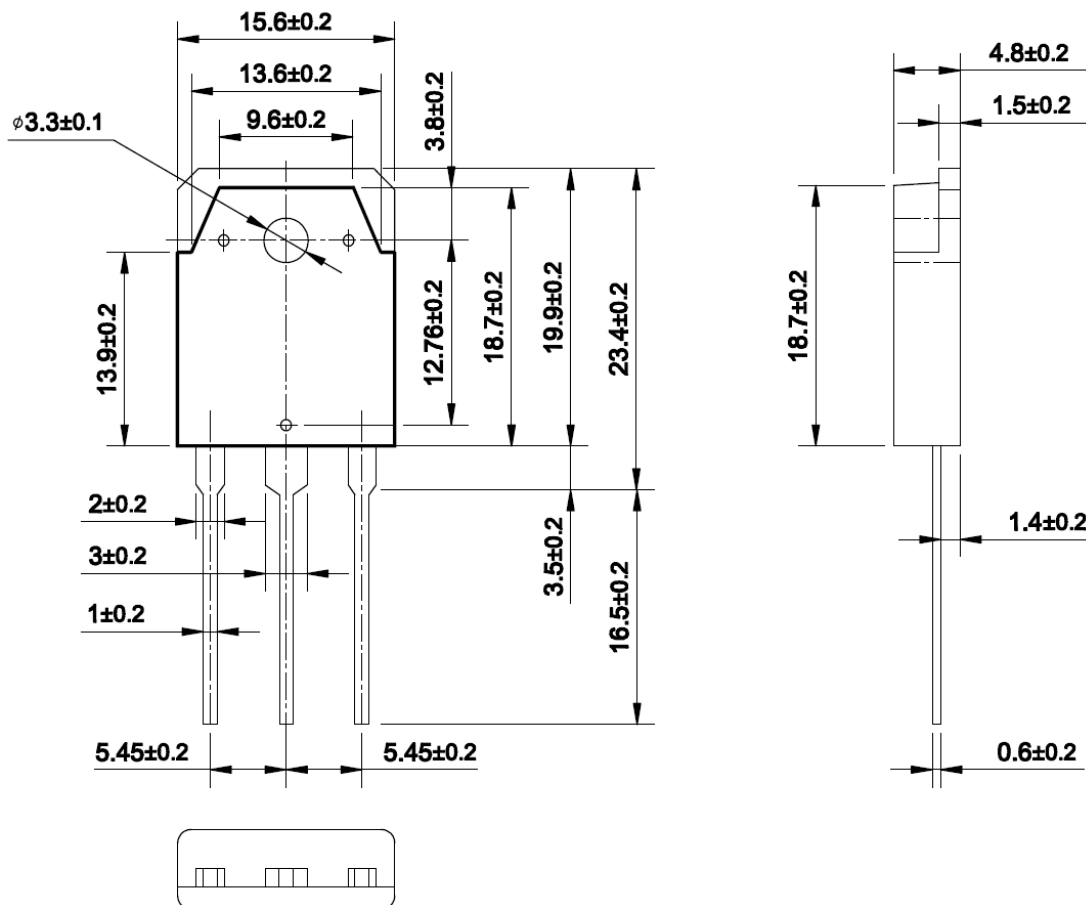
Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-3PN

(Dimensions in Millimeters)



SQAK3878 –N-Channel Enhancement Mode Power MOSFET