

650V 20A N-Channel Enhancement Mode Power MOSFET

Description

The AKQP20N65 is an N-Channel enhancement mode power MOSFET which using proprietary planar stripe and DMOS technology.

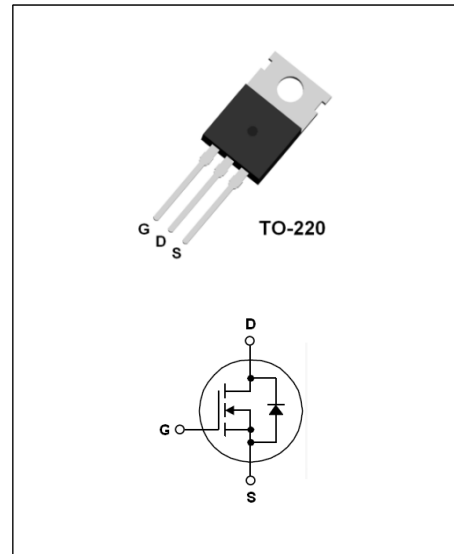
This MOSFET has low static on-resistance and high avalanche energy strength. This device provide excellent switching performance for UPS,DC-DC converters and AC-DC power supply.

Features

- Low on-Resistance: $R_{DS(on)}=0.39\Omega(\text{typ.})$
- Special Process Technology for high ESD Capability
- 100% Avalanche Test
- Good Stability and Uniformity with High E_{AS}

Applications

- UPS Applications
- DC-DC Converters and AC-DC Power Supply



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

Symbol	Parameter	Ratings	Unit	
V_{DSS}	Drain to Source Voltage	650	V	
V_{GSS}	Gate to Source Voltage	± 30	V	
I_D	Drain Current	$T_C=25^\circ\text{C}$	20	A
		$T_C=100^\circ\text{C}$	12	A
I_{DM}	Pulsed Drain Current (Note1)	80	A	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	222	W
	Derate above 25°C		1.78	W/ $^\circ\text{C}$
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	820	mJ	
T_J	Operating Junction Temperature Range	-55~+150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55~+150	$^\circ\text{C}$	

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	0.56	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$

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	650	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.5	-	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =10A	-	0.39	0.5	Ω
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650V, V _{GS} =0V	-	-	1	uA
I _{GSS}	Gate to Source Leakage Current	V _{GS} =±30V, 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		-	-	20	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =20A	-	0.86	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =20A,	-	535	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=-100A/us	-	9.5	-	uC

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 =20A, V _{DD} =325V, R _G =25Ω (Note 3)	-	62	-	ns
t _r	Rising Time		-	145	-	ns
t _{d(off)}	Turn-off Delay Time		-	220	-	ns
t _f	Falling Time		-	65	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1.0MHz	-	2360	-	pF
C _{oss}	Output Capacitance		-	1250	-	pF
C _{rss}	Reverse Transfer Capacitance		-	85	-	pF
Q _g	Total Gate Charge	I _D =20A, V _{DS} =480V V _{GS} =10V (Note 3)	-	75	-	nC
Q _{gs}	Gate to Source Charge		-	13.4	-	nC
Q _{gd}	Gate to Drain Charge		-	35	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. L=5mH, V_{DD}=50V, V_G=10V, @T_C=25 °C
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Region Characteristics

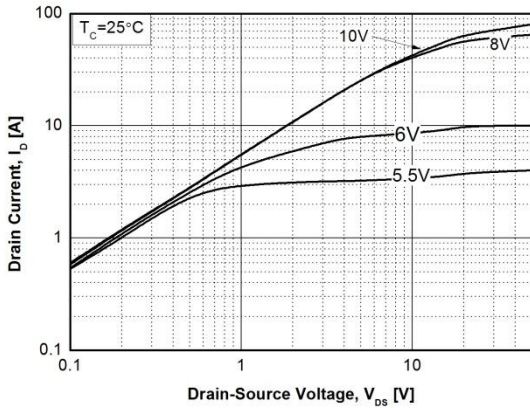


Fig. 2. Typical Transfer Characteristics

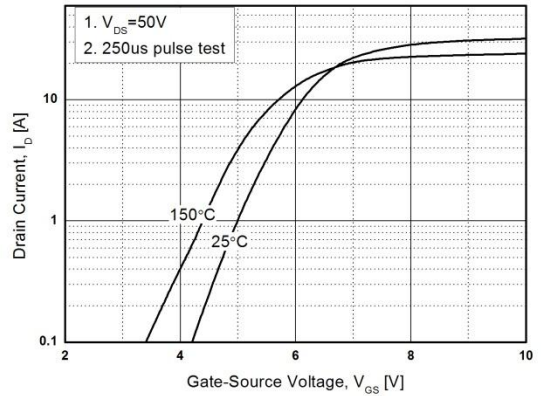


Fig. 3. Static on-Resistance vs. I_D

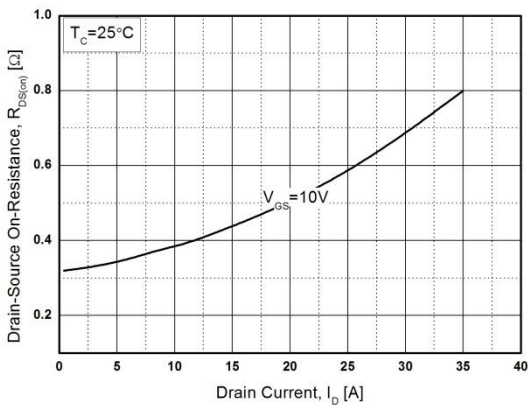


Fig. 4. Body Diode Forward Voltage vs. I_{DR}

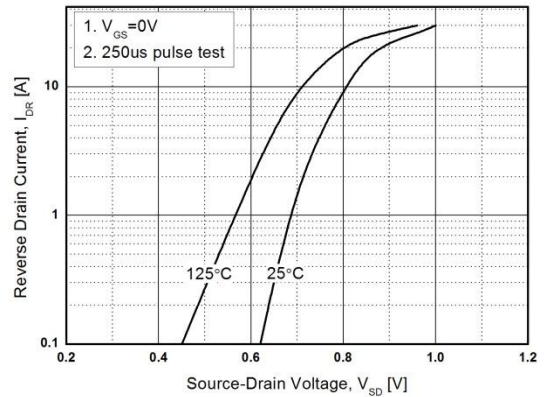


Fig. 5. Capacitance Characteristics

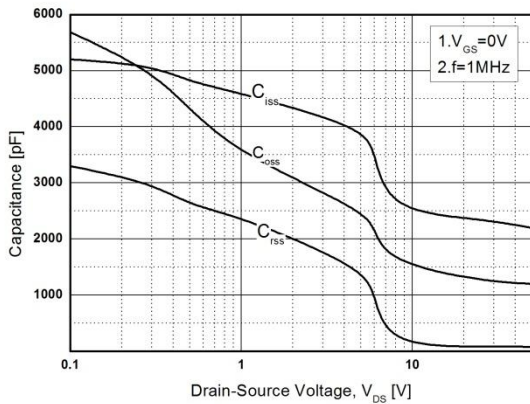
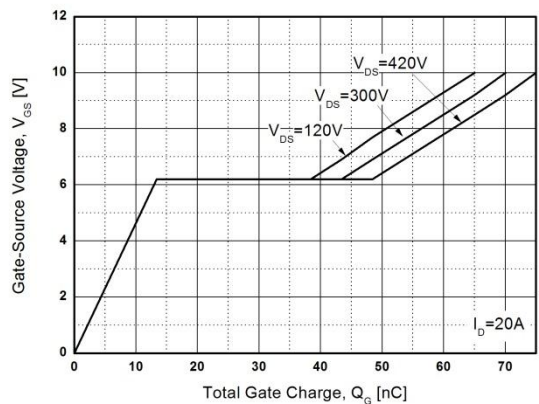


Fig. 6. Gate Charge Characteristics



Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

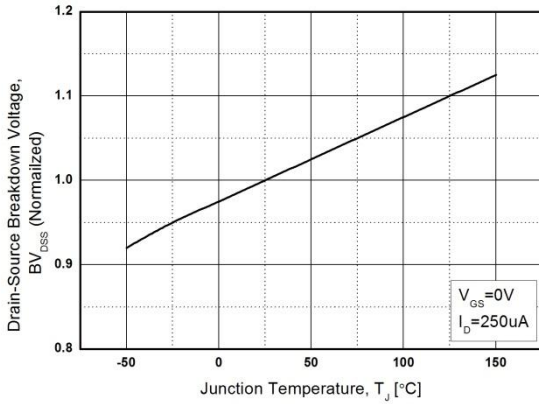


Fig. 8. Static on-Resistance vs. Temperature

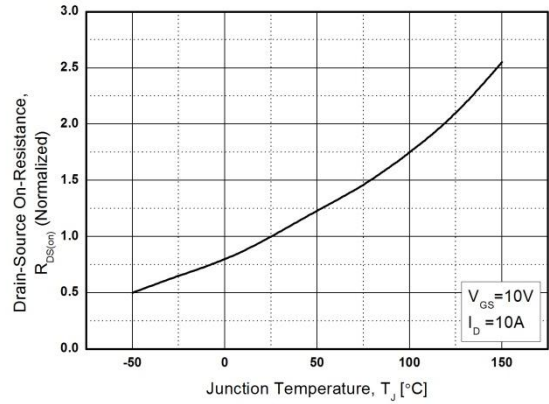


Fig. 9. Maximum Safe Operating Area

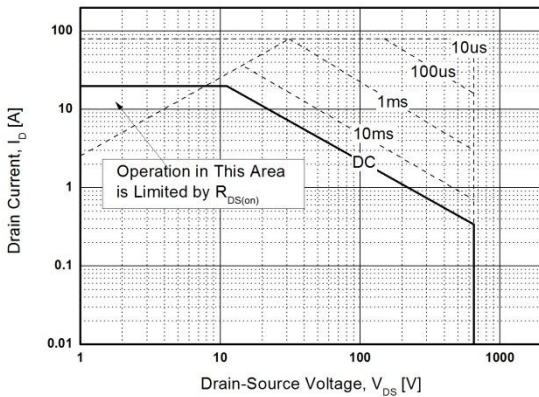


Fig. 10. Maximum Drain Current vs. Temperature

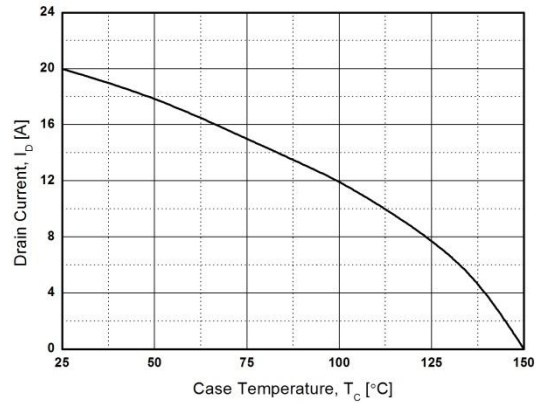
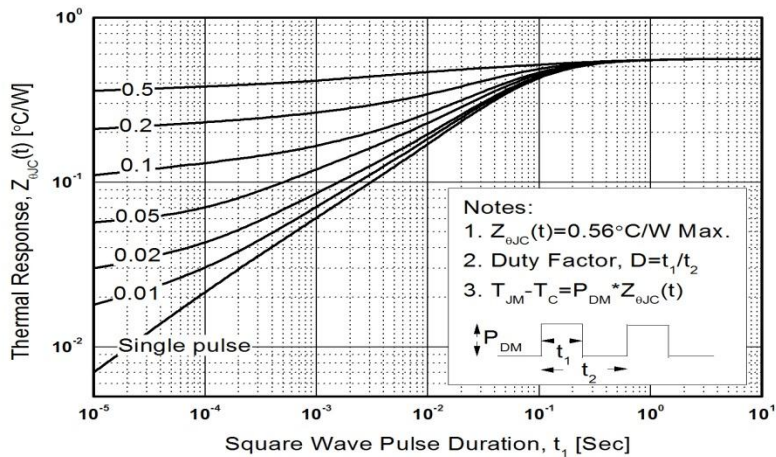


Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-220

(Dimensions in Millimeters)

