

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3639 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, and designed for low voltage high current applications such as DC/DC converter with synchronous rectifier.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 5.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 32 \text{ A)}$
 $R_{DS(on)2} = 8.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 32 \text{ A)}$
- Low C_{iss} : $C_{iss} = 2400 \text{ pF TYP.}$

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

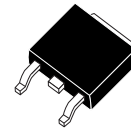
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	20	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 64	A
Drain Current (pulse) ^{Note}	$I_{D(pulse)}$	± 256	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	40	W
Total Power Dissipation	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Note $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3639-ZK	TO-252 (MP-3ZK)

(TO-252)



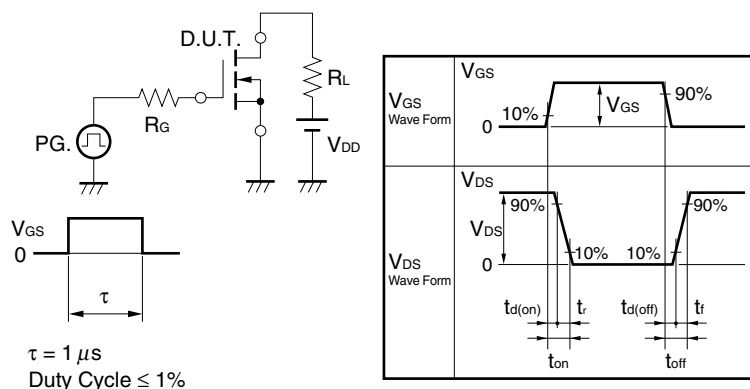
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

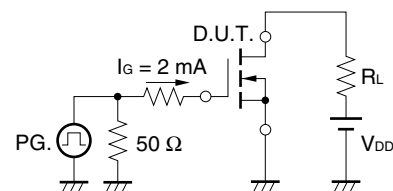
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5		2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 32 A	19	39		S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = 10 V, I _D = 32 A		4.4	5.5	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 32 A		5.8	8.5	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		2400		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		970		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		350		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10 V, I _D = 32 A		13		ns
Rise Time	t _r	V _{GS} = 10 V		14		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		71		ns
Fall Time	t _f			22		ns
Total Gate Charge	Q _G	V _{DD} = 16 V		45		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		7.6		nC
Gate to Drain Charge	Q _{GD}	I _D = 64 A		11		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 64 A, V _{GS} = 0 V		0.96		V
Reverse Recovery Time	t _{rr}	I _F = 64 A, V _{GS} = 0 V		40		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		35		nC

Note Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

TEST CIRCUIT 1 SWITCHING TIME

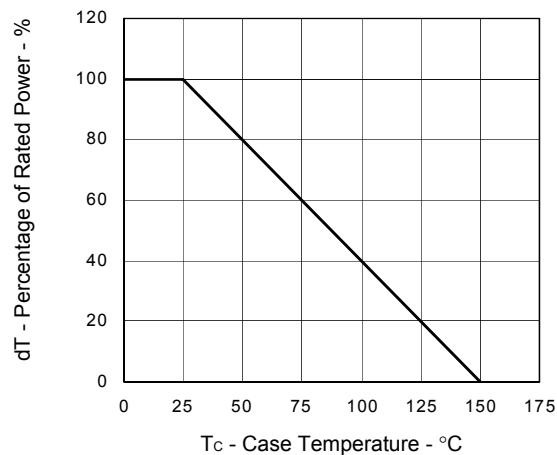


TEST CIRCUIT 2 GATE CHARGE

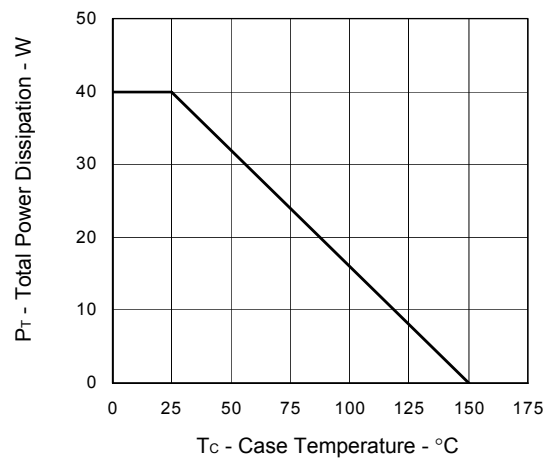


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

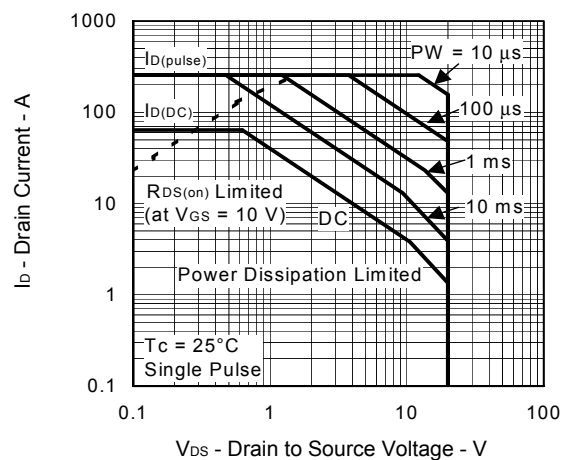
DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREA



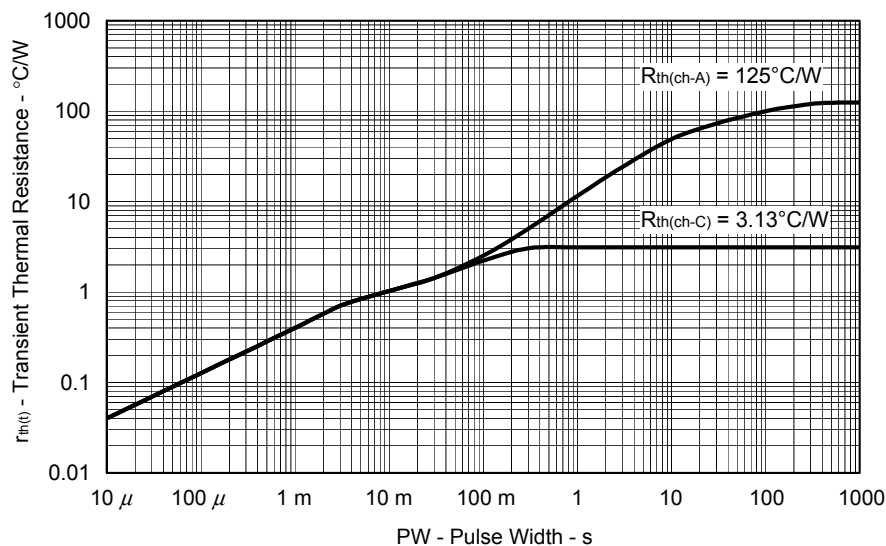
TOTAL POWER DISSIPATION vs.
CASE TEMPERATURE

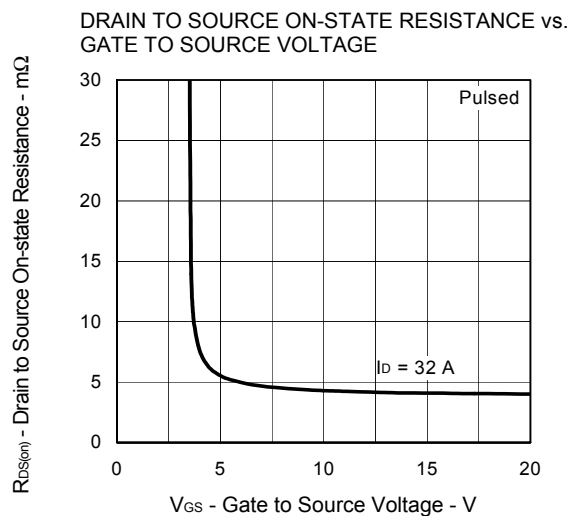
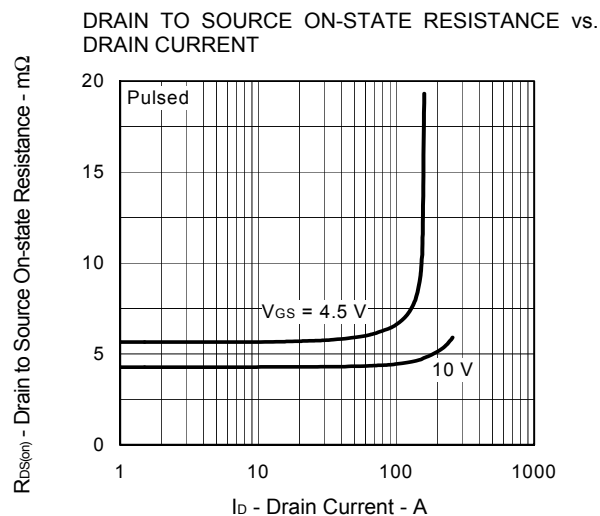
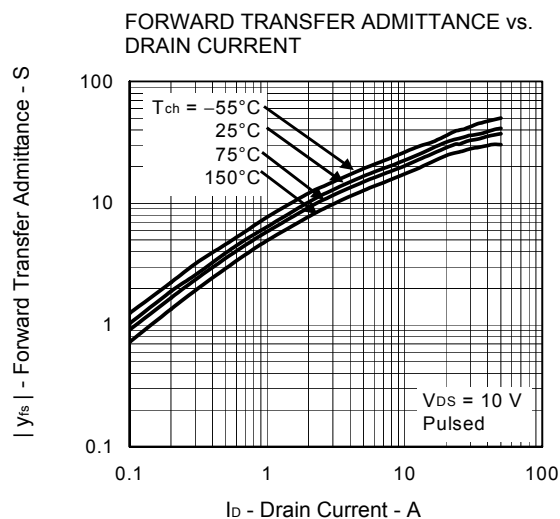
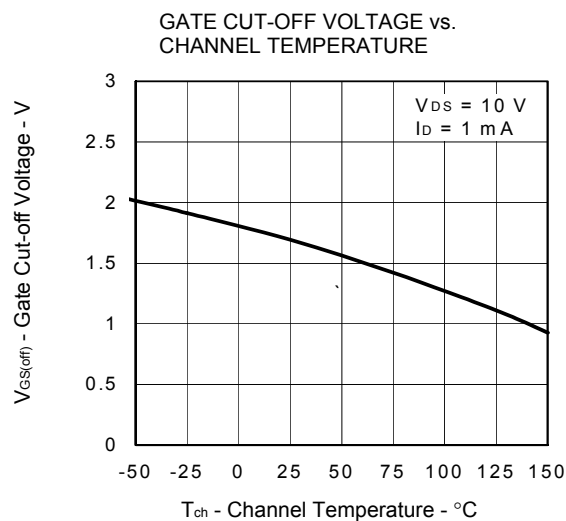
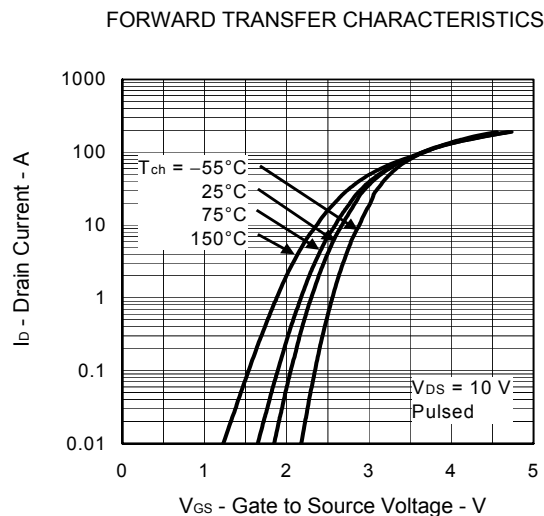
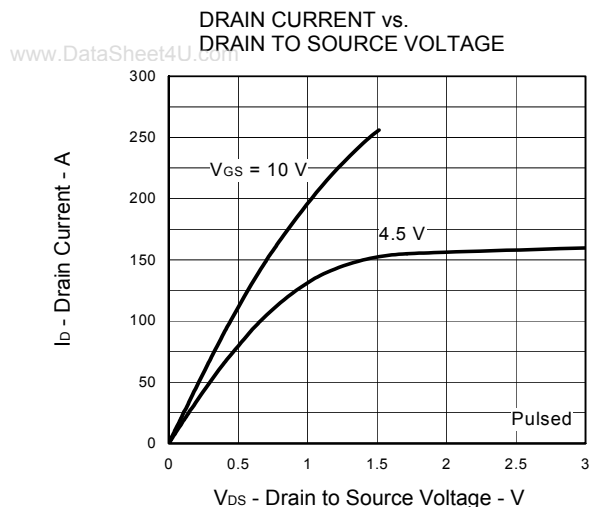


FORWARD BIAS SAFE OPERATING AREA

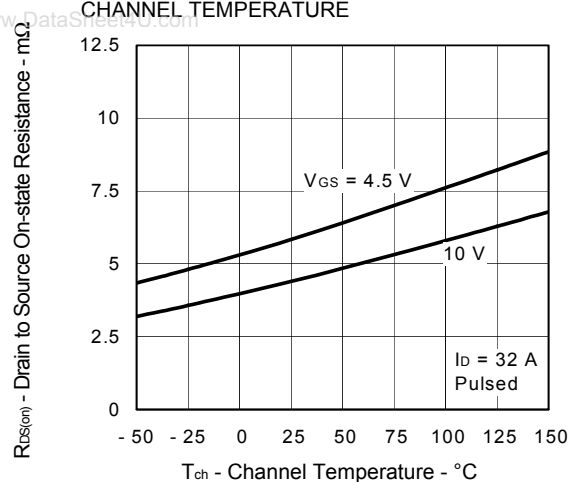


TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

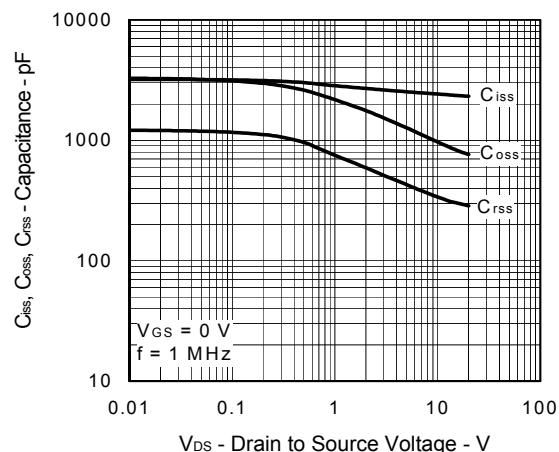




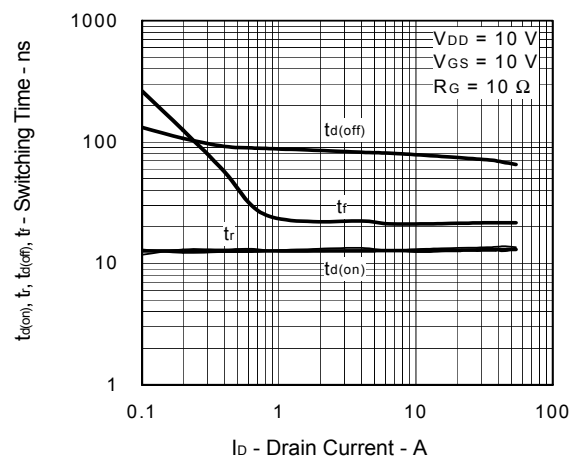
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



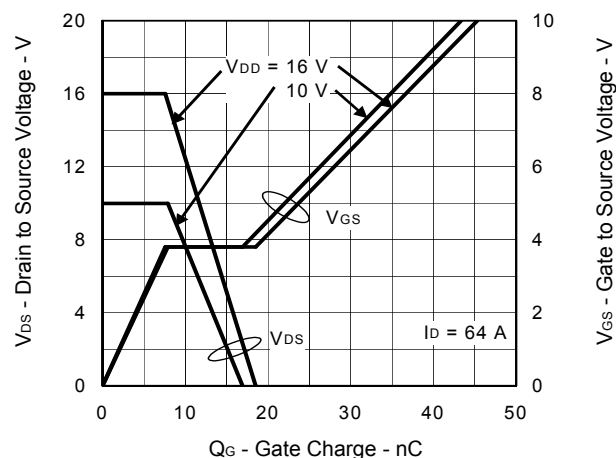
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



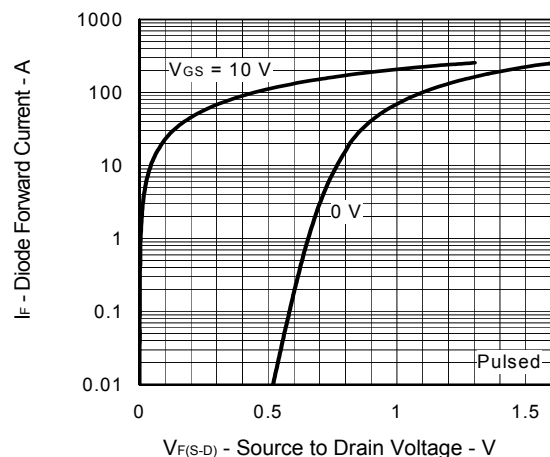
SWITCHING CHARACTERISTICS



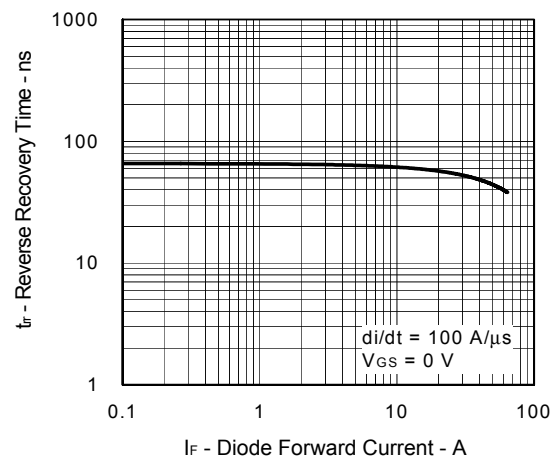
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



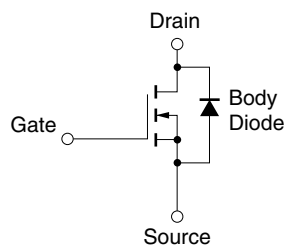
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



TO-252 (MP-3ZK)



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