

1. Features

- $R_{DS(ON)}=40m\Omega(\text{typ.})@V_{GS}=20V, T_J=25^\circ C$
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes
- Easy to Parallel and Simple to Drive
- Halogen Free, RoHS Compliant

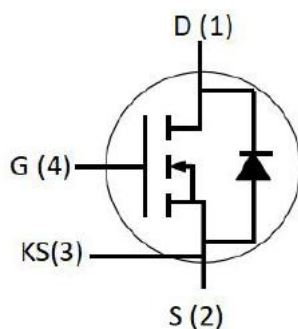
2. Applications

- Solar Inverters
- High Voltage DC-DC Converters
- Power Factor Correction Modules
- EV Charging
- DC-AC Inverters

3. Pin configuration



TO-247-4



Pin	Function
1	Drain
2	Source
3	KS
4	Gate

4. Ordering Information

Part Number	Package	Brand
KSZ040N120A	TO-247-4	KIA

5. Absolute maximum ratings

(T_C= 25°C , unless otherwise specified)

Parameter	Symbol	Rating	Unit
Drain-to-Source Voltage	V _{DSS}	1200	V
Gate-to-Source Operation Voltage	V _{GSS}	-5/+18	V
Continuous Drain Current	I _D	60	A
Continuous Drain Current @T _C =100°C		40	A
Pulsed Drain Current (T _C =25°C, tp limited by T _{Jmax})	I _D pulse	100	A
Single Pulse Avalanche Energy(L=10mH)	E _{AS}	934	mJ
Power Dissipation	P _D	375	W
Operating and Storage Temperature Range	T _J &T _{STG}	-55 to 175	°C

Caution: Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

6. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Case	R _{θJC}	0.40	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	38	°C/W

7. Electrical characteristics

(T_J=25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	1200	-	-	V
Drain-source leakage current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V	-	0.35	100	uA
Gate-source leakage current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	-	20	200	nA
Drain-source on-resistance	R _{Ds(on)}	V _{GS} =20V, I _D =40A, T _J =25°C	-	40	60	mΩ
		V _{GS} =20V, I _D =40A, T _J =175°C	-	68	-	mΩ
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =10mA, T _J =25°C	2.0	3.2	4.0	V
		V _{DS} =V _{GS} , I _D =10mA, T _J =175°C	-	2.3	-	V
Transconductance	g _{FS}	V _{DS} =20V, I _D =40A	-	14.1	-	S
Gate Resistance	R _g	V _{GS} =0V, V _{AC} =25mV, f=1MHz	-	2.55	-	Ω
Input capacitance	C _{iss}	V _{DS} =1000V, V _{GS} =0V f=1MHz, V _{AC} =25mV	-	3110	-	pF
Reverse transfer capacitance	C _{rss}		-	24	-	pF
Output capacitance	C _{oss}		-	185	-	pF
Total gate charge	Q _g	V _{DD} =800V, I _D =40A V _{GS} =-5 to +20V	-	148	-	nC
Gate-source charge	Q _{gs}		-	62	-	nC
Gate-drain charge	Q _{gd}		-	33	-	nC
Turn-on delay time	t _{d(on)}	V _{DS} =800V, V _{GS} =-5 to +20V, R _G =5Ω, I _D =40A, T _J =25°C, inductive load	-	23	-	ns
Rise time	t _r		-	47	-	ns
Turn-off delay time	t _{d(off)}		-	39	-	ns
Fall time	t _f		-	53	-	ns
Turn-On Switching Energy	E _{ON}		-	1.3	-	mJ
Turn-Off Switching Energy	E _{OFF}	V _{DS} =800V, V _{GS} =-5 to +20V, R _G =5Ω, I _D =40A, T _J =25°C, L=80uH	-	0.8	-	mJ
Diode forward voltage	V _{SD}	I _{SD} =20A, V _{GS} =-5V, T _J =25°C	-	3.4	-	V
		I _{SD} =20A, V _{GS} =-5V, T _J =150°C	-	3.1	-	V
Reverse Recovery Time	t _{rr}	I _{SD} =40A, V _{GS} =-5V, di/dt=2000A/us, V _{DS} =800V	-	50	-	ns
Reverse Recovery Charge	Q _{rr}		-	140	-	nC
Peak Reverse Recovery Current	I _{rrm}		-	5	-	A

8. Test circuits and waveforms

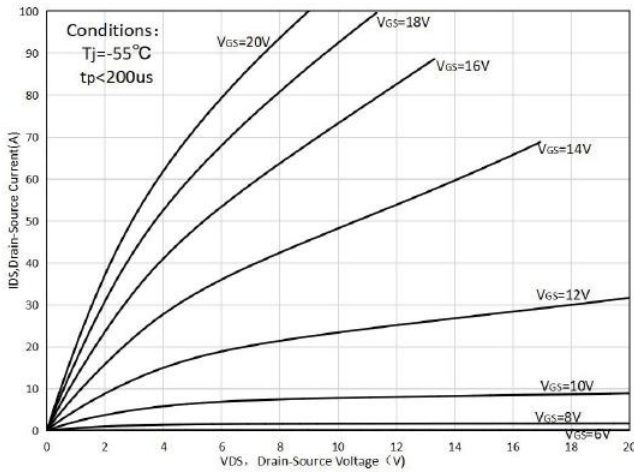


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

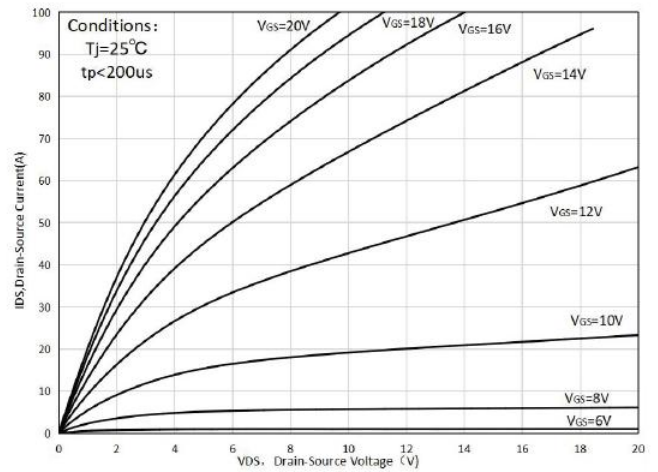


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

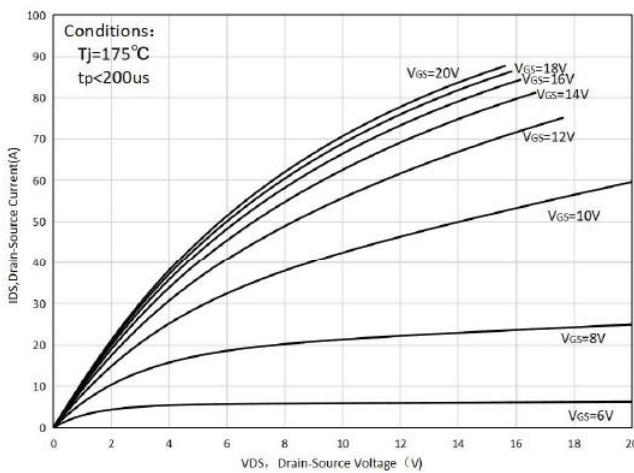


Figure 3. Output Characteristics $T_J = 150^\circ\text{C}$

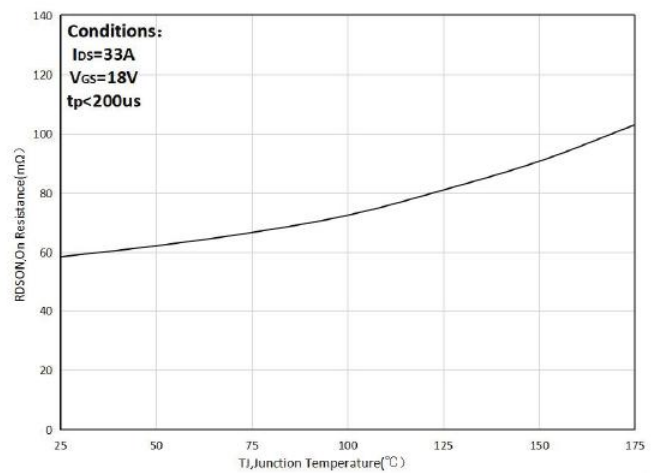


Figure 4. On-Resistance For Various Gate Voltage

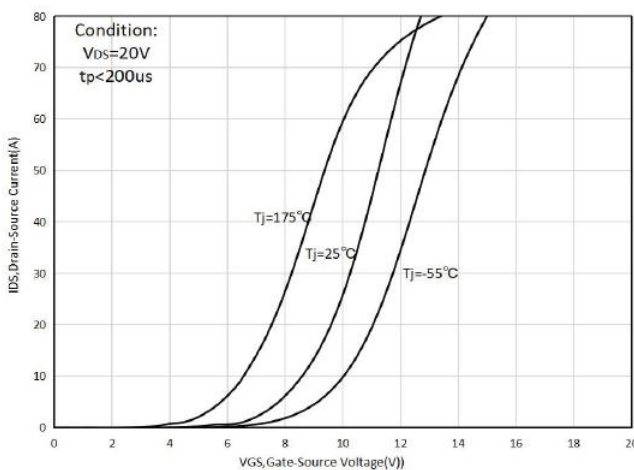


Figure 5. Transfer Characteristic for Various T_J

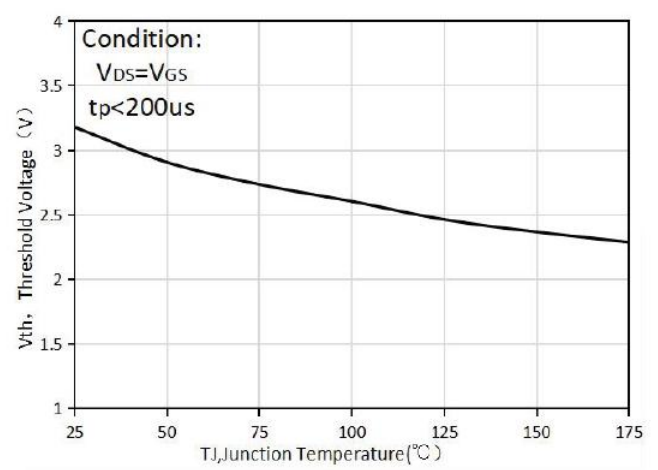


Figure 6. Threshold Voltage vs. Temperature

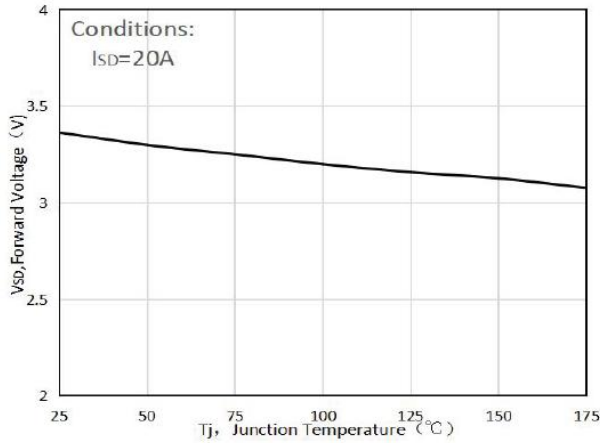


Figure 7. Forward Voltage VS Junction Temperature

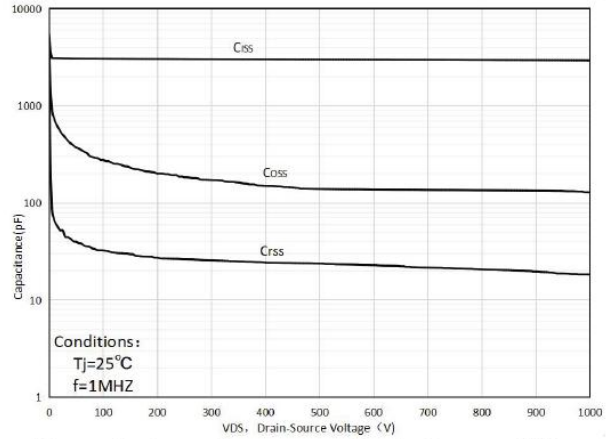


Figure 8. Capacitances vs. Drain-Source Voltage

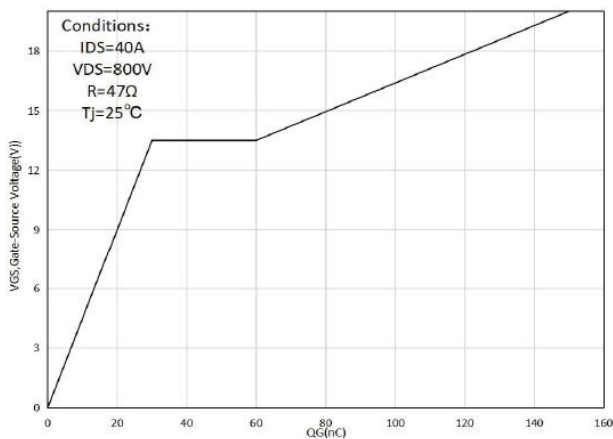


Figure 9. Gate Charge Characteristics

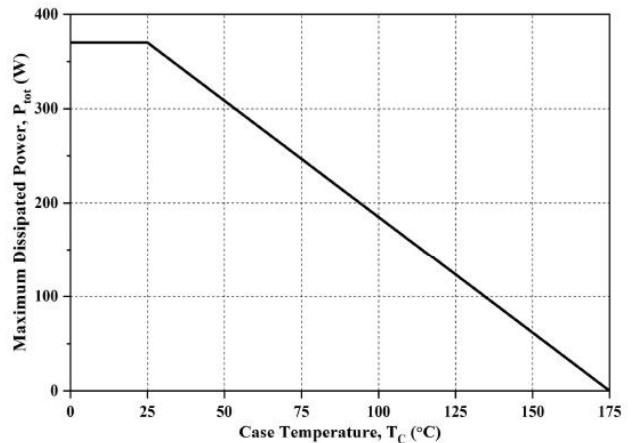


Figure 10. Power Dissipation Derating

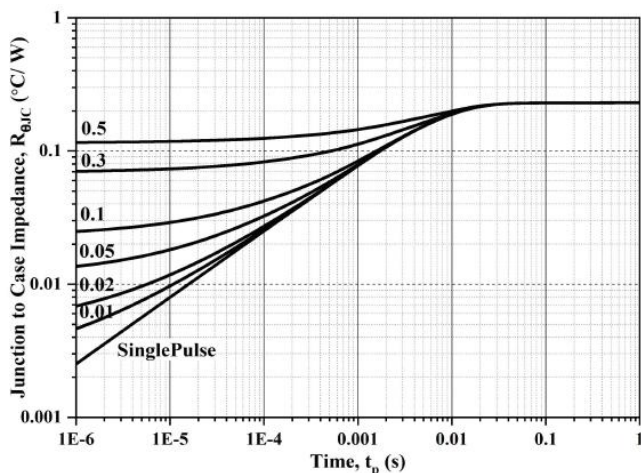


Figure 11. Transient Thermal Impedance

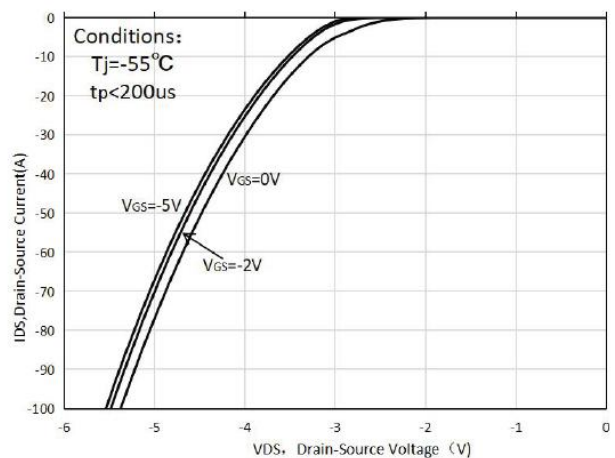


Figure 12. Body Diode Characteristics at -55°C

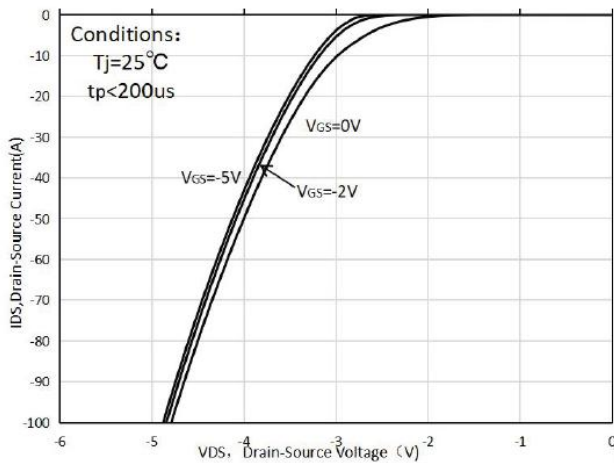


Figure 13. Body Diode Characteristics at 25°C

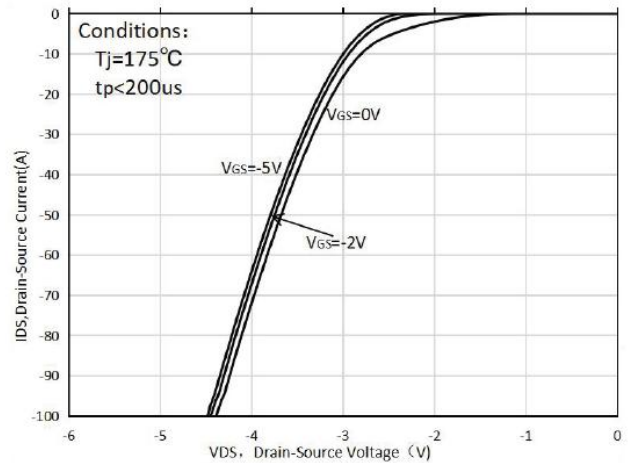


Figure 14. Body Diode Characteristics at 175°C

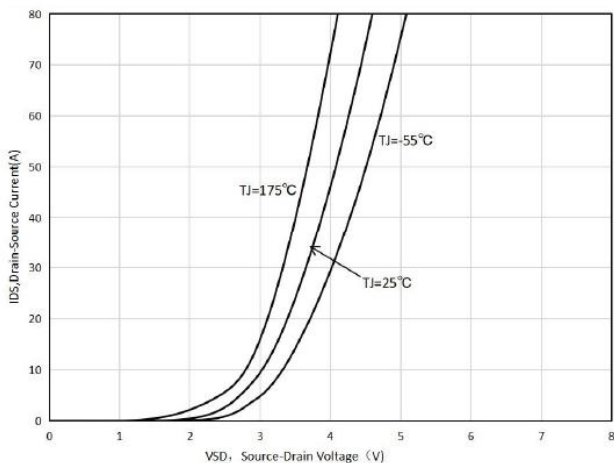


Figure 15. Body Diode Characteristics for Various T_j

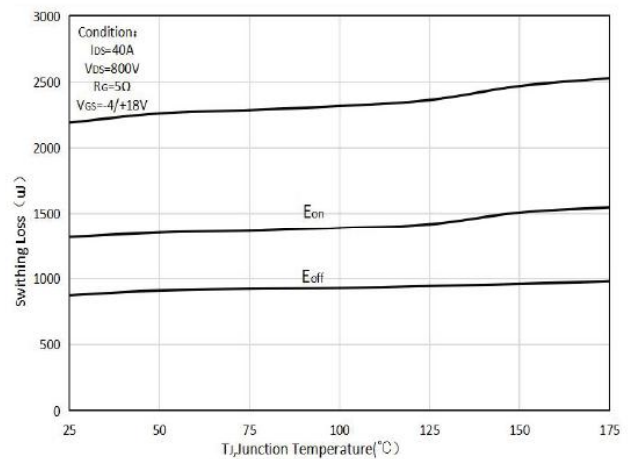


Figure 16. Clamped Inductive Switching Energy Vs. T_j

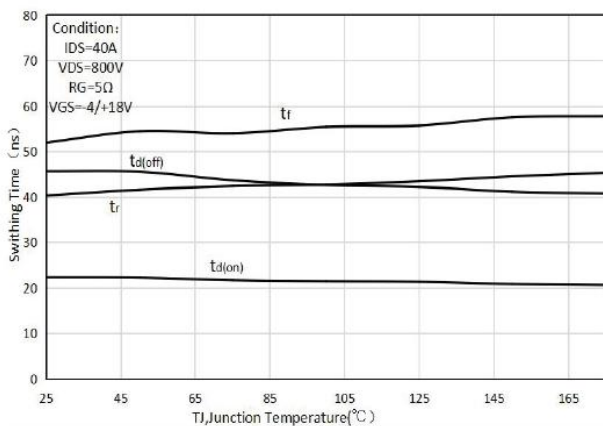


Figure 17. Switching Times vs. Junction Temperature

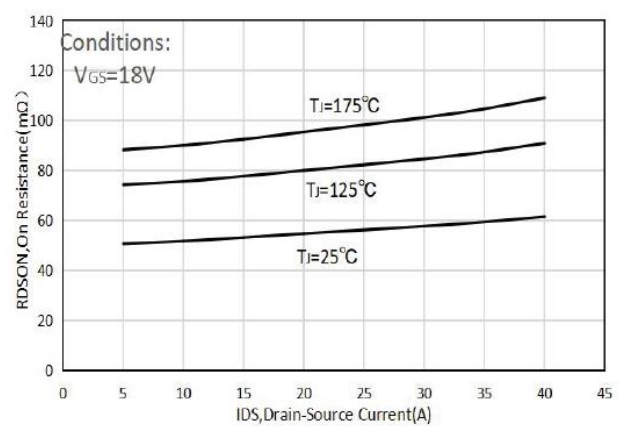
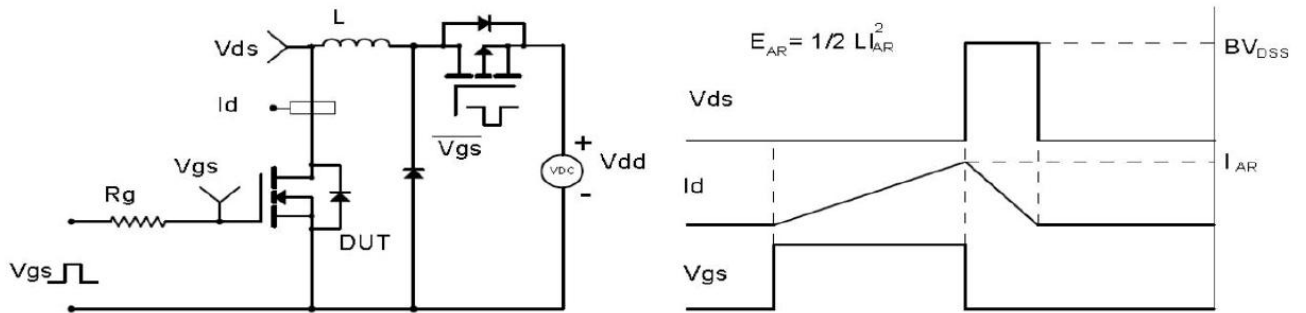


Figure 18. On-Resistance vs. Drain Current

9. Test Circuits and Waveform

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

