

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

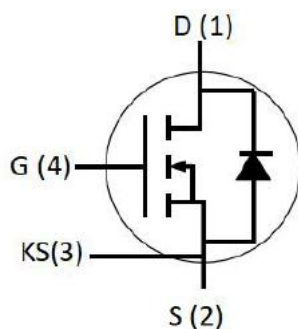
2. Applications

- 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 Tjmax)	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

($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	1200	-	-	V
Drain-source leakage current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	-	0.35	100	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	-	20	200	nA
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=20V, I_D=40A, T_J=25^{\circ}\text{C}$	-	40	60	m Ω
		$V_{GS}=20V, I_D=40A, T_J=175^{\circ}\text{C}$	-	68	-	m Ω
Gate threshold voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=10mA, T_J=25^{\circ}\text{C}$	2.0	3.2	4.0	V
		$V_{DS}=V_{GS}, I_D=10mA, T_J=175^{\circ}\text{C}$	-	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	$V_{DD}=800V, I_D=40A$ $V_{GS}=-5 \text{ to } +20V$	-	148	-	nC
Gate-source charge	Q_{gs}		-	62	-	nC
Gate-drain charge	Q_{gd}		-	33	-	nC
Turn-on delay time	$t_{d(on)}$	$V_{DS}=800V, V_{GS}=-5 \text{ to } +20V,$ $R_G=5\Omega, I_D=40A, T_J=25^{\circ}\text{C},$ 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}	$V_{DS}=800V, V_{GS}=-5 \text{ to } +20V,$ $R_G=5\Omega, I_D=40A,$ $T_J=25^{\circ}\text{C}, L=80\mu H$	-	1.3	-	mJ
Turn-Off Switching Energy	E_{OFF}		-	0.8	-	mJ
Diode forward voltage	V_{SD}	$I_{SD}=20A, V_{GS}=-5V, T_J=25^{\circ}\text{C}$	-	3.4	-	V
		$I_{SD}=20A, V_{GS}=-5V, T_J=150^{\circ}\text{C}$	-	3.1	-	V
Reverse Recovery Time	t_{rr}	$I_{SD}=40A, V_{GS}=-5V,$ $di/dt=2000A/\mu s, V_{DS}=800V$	-	50	-	ns
Reverse Recovery Charge	Q_{rr}		-	140	-	nC
Peak Reverse Recovery Current	I_{rrm}		-	5	-	A

8. Test circuits and waveforms

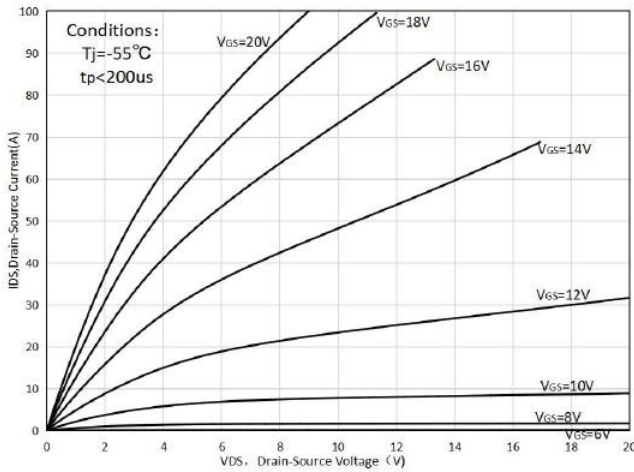


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

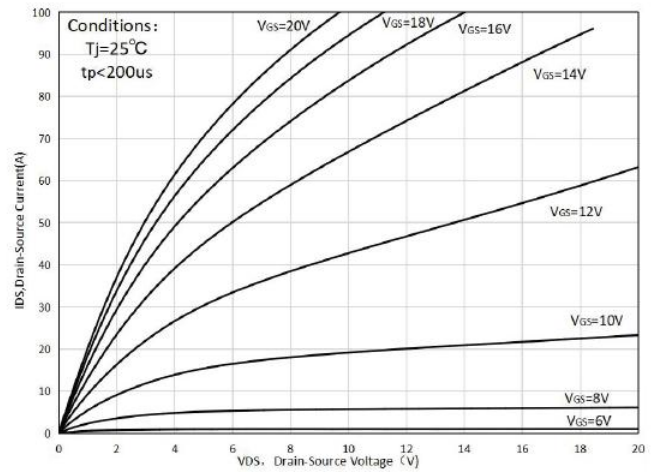


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

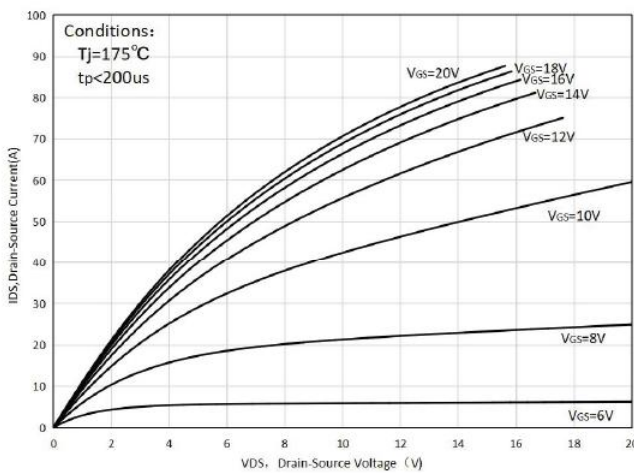


Figure 3. Output Characteristics $T_J = 150^\circ\text{C}$

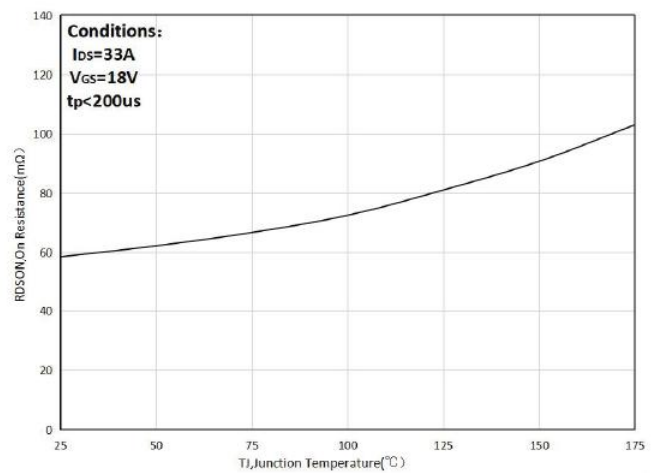


Figure 4. On-Resistance For Various Gate Voltage

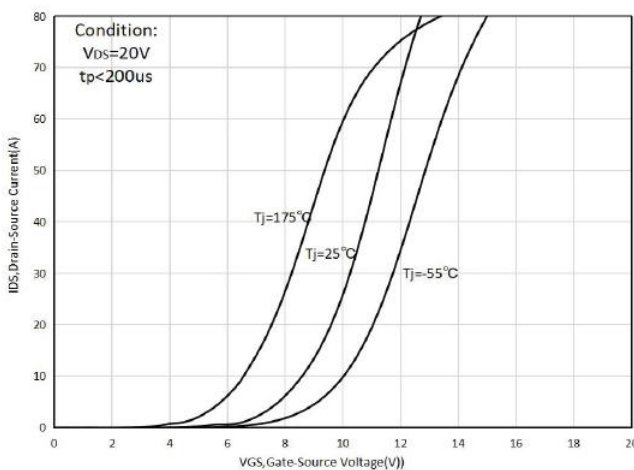


Figure 5. Transfer Characteristic for Various T_J

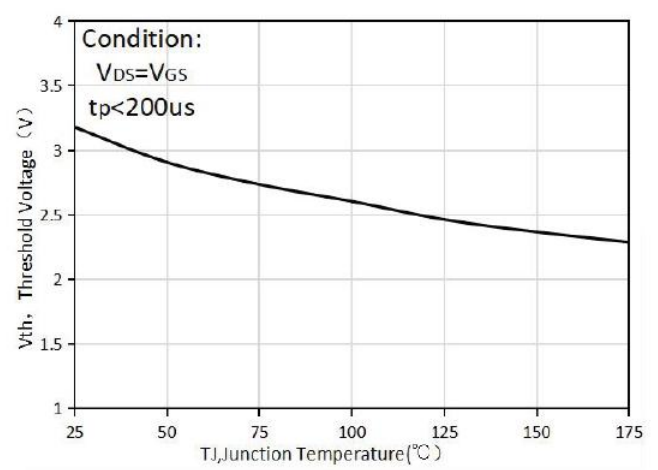


Figure 6. Threshold Voltage vs. Temperature

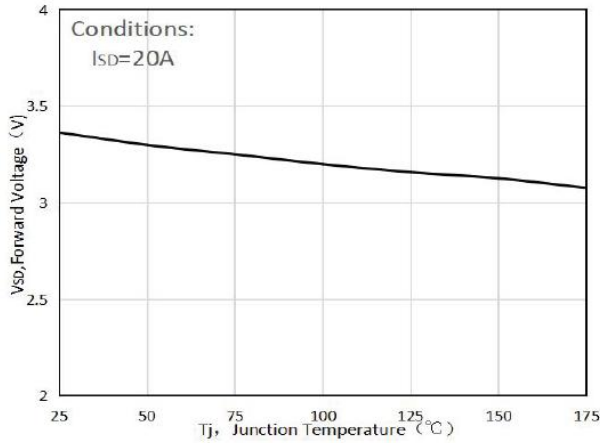


Figure 7. Forward Voltage VS Junction Temperature

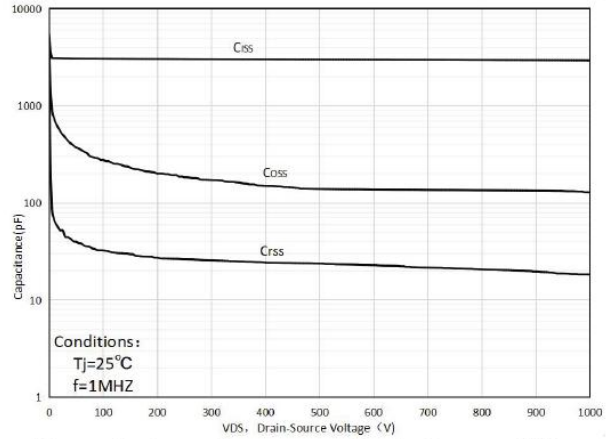


Figure 8. Capacitances vs. Drain-Source Voltage

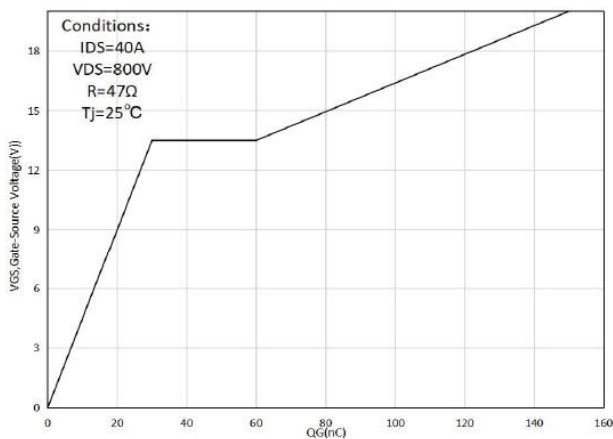


Figure 9. Gate Charge Characteristics

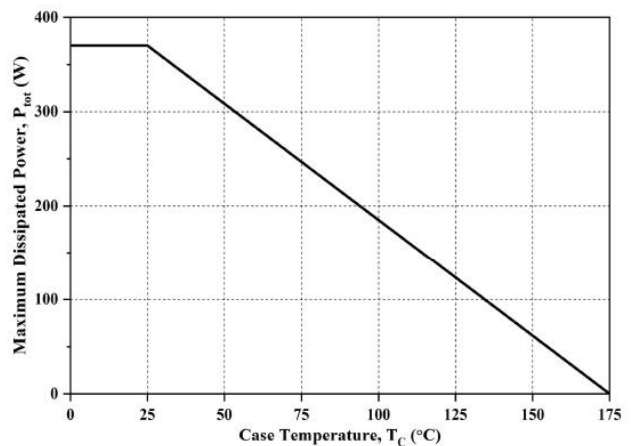


Figure 10. Power Dissipation Derating

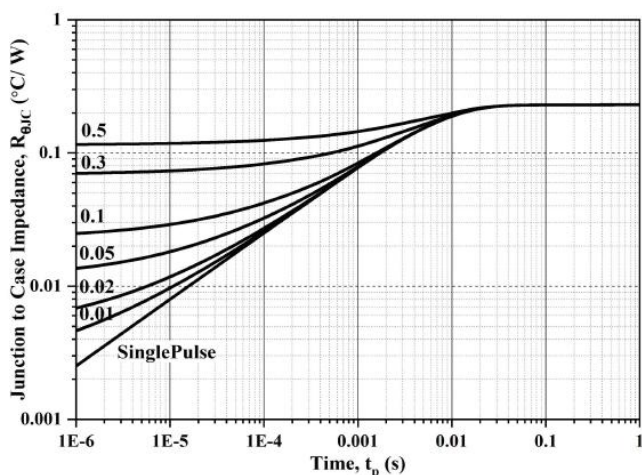


Figure 11. Transient Thermal Impedance

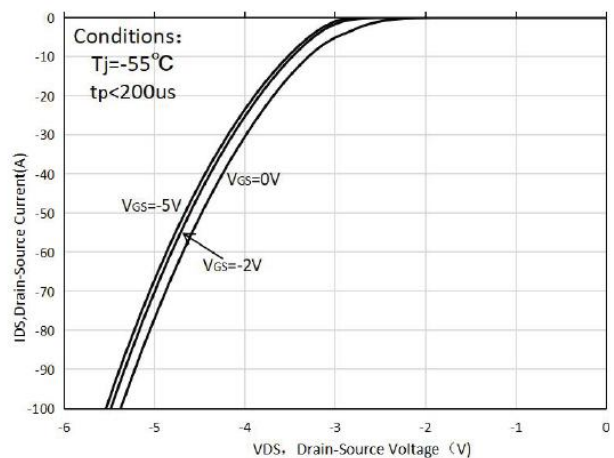


Figure 12. Body Diode Characteristics at -55°C

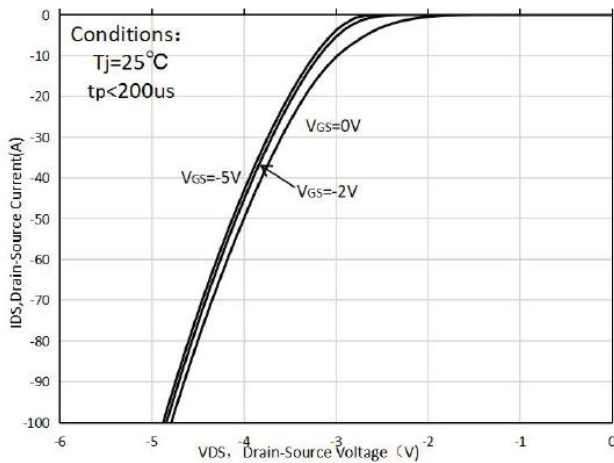


Figure 13. Body Diode Characteristics at 25°C

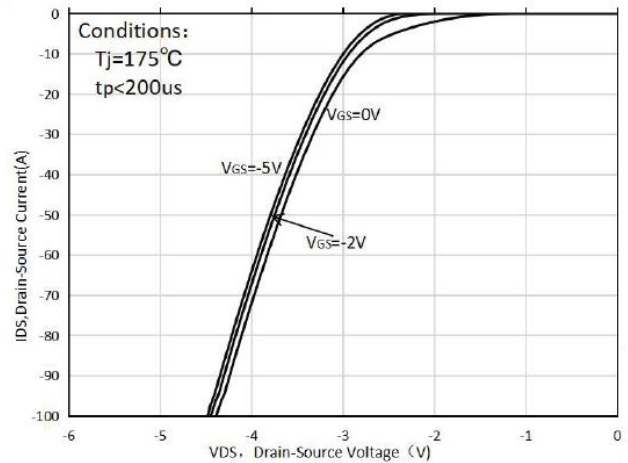


Figure 14. Body Diode Characteristics at 175°C

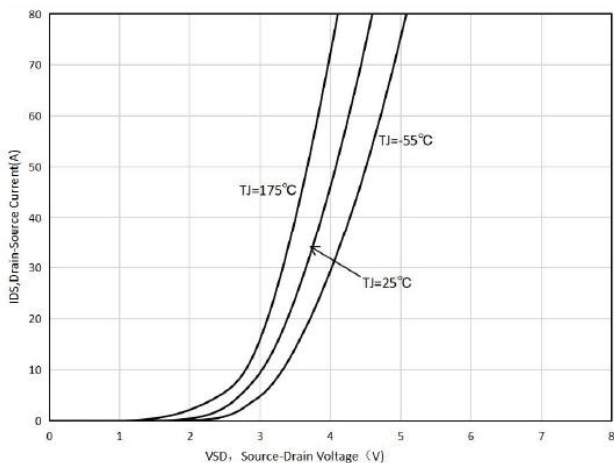


Figure 15. Body Diode Characteristics for Various T_J

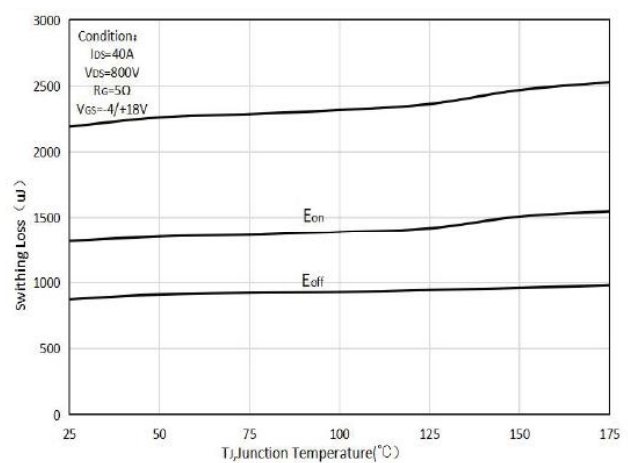


Figure 16. Clamped Inductive Switching Energy Vs. T_J

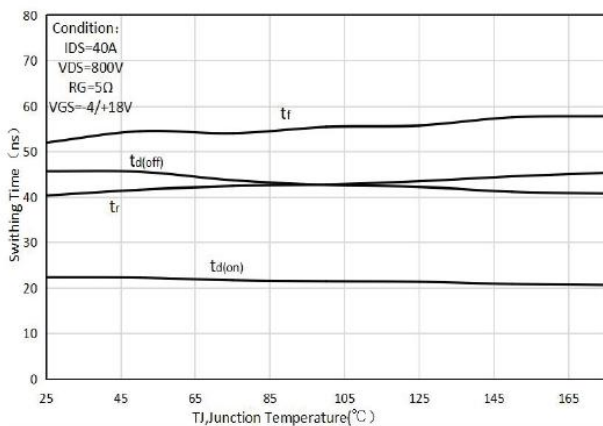


Figure 17. Switching Times vs. Junction Temperature

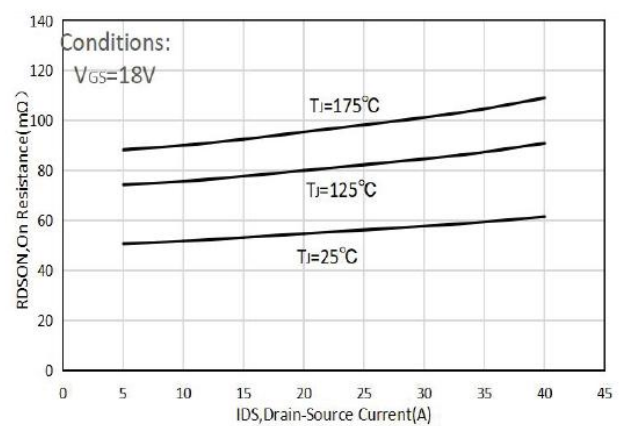
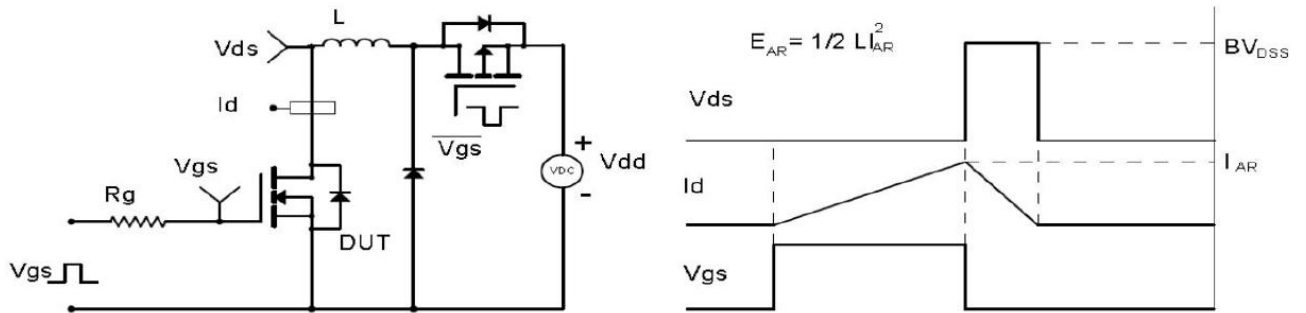


Figure 18. On-Resistance vs. Drain Current

9. Test Circuits and Waveform

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

