

RoHS Compliant Product  
A suffix of "-C" specifies halogen free

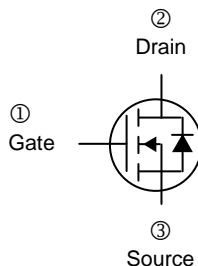
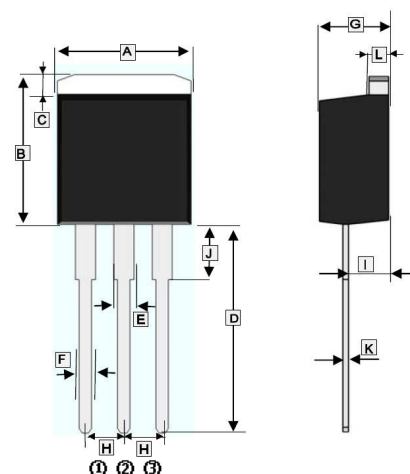
## DESCRIPTION

The SIK04N65SL is the highest performance trench N-ch MOSFETs with extreme high cell density , which provide excellent  $R_{DS(on)}$  and gate charge for most of the synchronous buck converter applications .

## FEATURES

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent  $CdV/dt$  effect decline
- 100% EAS Guaranteed
- Green Device Available

## TO-262



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	9.80	10.40	G	4.40	4.85
B	9.60	10.50	H	2.54 BSC	
C	1.19	1.40	J	2.70 BSC	
D	12.3	14.3	I	4.00 BSC	
E	1.10	1.50	K	0.25	0.56
F	0.68	1.00	L	1.10	1.45

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	4
		$T_C=100^\circ\text{C}$	2.8
Pulsed Drain Current	$I_{DM}$	16	A
Total Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	95
		Derate above $25^\circ\text{C}$	0.76
Single Pulse Avalanche Energy <sup>1</sup>	$E_{AS}$	202	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~150	$^\circ\text{C}$
<b>Thermal Resistance Rating</b>			
Maximum Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C} / \text{W}$
Maximum Thermal Resistance Junction-Case	$R_{\theta JC}$	1.32	$^\circ\text{C} / \text{W}$

Notes:

1.  $L=30\text{mH}, I_{AS}=3.36\text{A}, V_{DD}=150\text{V}, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$

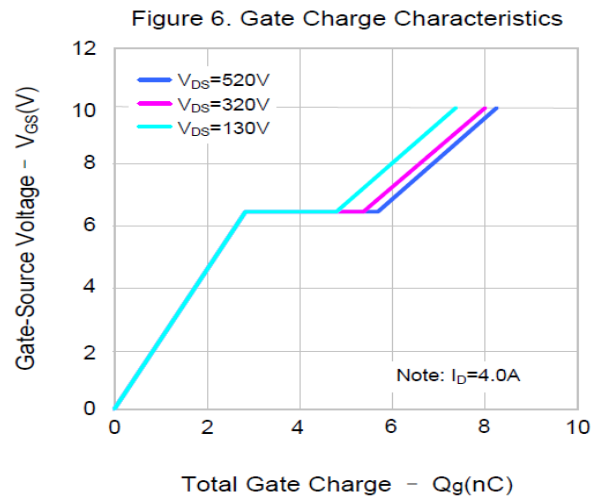
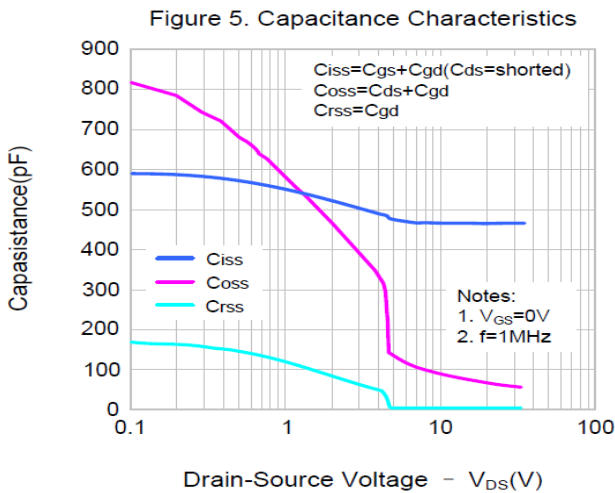
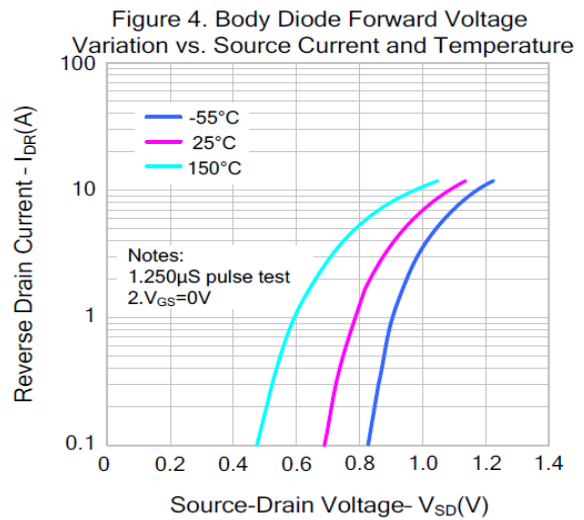
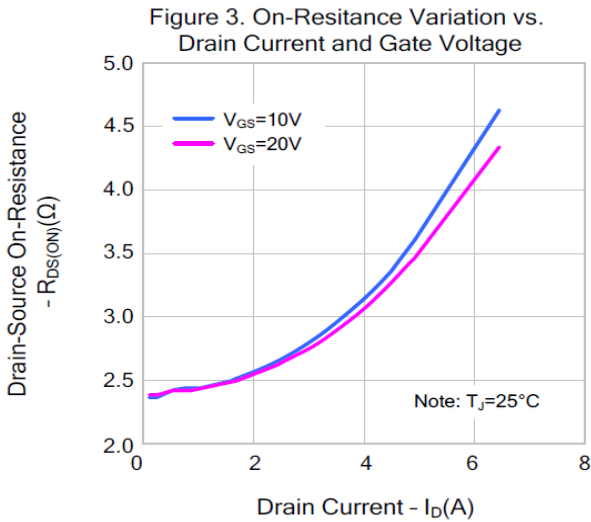
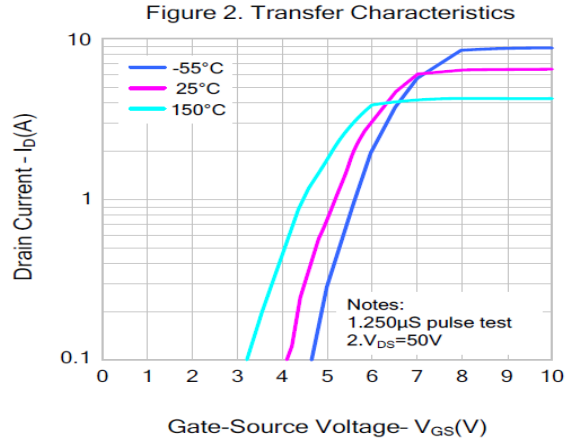
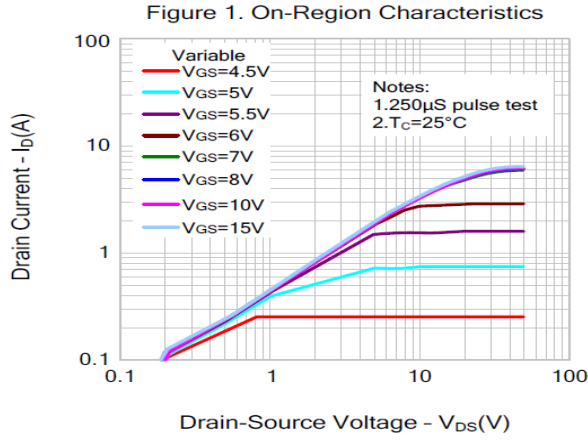
**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	650	-	-	V	$V_{GS}=0, I_D=250\mu\text{A}$
Gate-Threshold Voltage	$V_{GS(th)}$	2	-	4	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS}=\pm 30\text{V}$
Drain-Source Leakage Current	$I_{DSS}$	-	-	1	$\mu\text{A}$	$V_{DS}=650\text{V}, V_{GS}=0$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	2.3	2.7	$\Omega$	$V_{GS}=10\text{V}, I_D=2\text{A}$
Total Gate Charge <sup>1,2</sup>	$Q_g$	-	8.03	-	nC	$I_D=4\text{A}$ $V_{DS}=520\text{V}$ $V_{GS}=10\text{V}$
Gate-Source Charge <sup>1,2</sup>	$Q_{gs}$	-	2.57	-		
Gate-Drain Change <sup>1,2</sup>	$Q_{gd}$	-	3.03	-		
Turn-on Delay Time <sup>1,2</sup>	$T_{d(on)}$	-	16.6	-	nS	$V_{DD}=325\text{V}$ $I_D=4\text{A}$ $R_G=25\Omega$
Rise Time <sup>1,2</sup>	$T_r$	-	37.33	-		
Turn-off Delay Time <sup>1,2</sup>	$T_{d(off)}$	-	18	-		
Fall Time <sup>1,2</sup>	$T_f$	-	19.2	-		
Input Capacitance	$C_{iss}$	-	464	-	pF	$V_{GS}=0$ $V_{DS}=25\text{V}$ $f=1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	54	-		
Reverse Transfer Capacitance	$C_{rss}$	-	1.32	-		
<b>Source-Drain Diode</b>						
Diode Forward Voltage	$V_{SD}$	-	-	1.4	V	$I_S=4\text{A}, V_{GS}=0$
Continuous Source Current	$I_S$	-	-	4	A	Integral Reverse P-N Junction Diode in the MOSFET
Pulsed Source Current	$I_{SM}$	-	-	16	A	
Reverse Recovery Time	$T_{rr}$	-	455.23	-	ns	$I_S=4\text{A}, V_{GS}=0,$ $di_f/dt=100\text{A}/\mu\text{S}$
Reverse Recovery Charge	$Q_{rr}$	-	2.01	-	$\mu\text{C}$	

Notes:

1. Pulse Test: Pulse width  $\leq 300\mu\text{S}$ , Duty cycle  $\leq 2\%$
2. Essentially independent of operating temperature.

**CHARACTERISTIC CURVES**



## CHARACTERISTIC CURVES

Figure 7. Breakdown Voltage Variation vs. Temperature

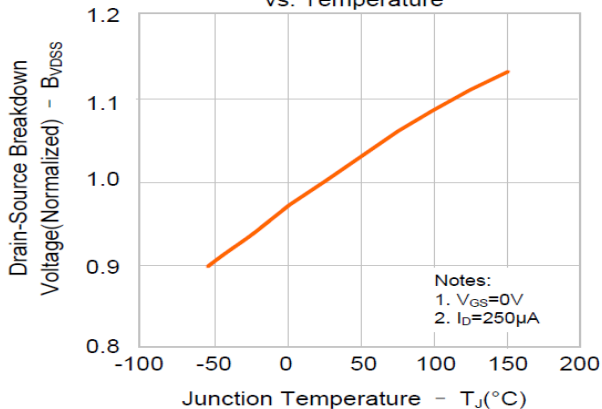


Figure 8. On-resistance Variation vs. Temperature

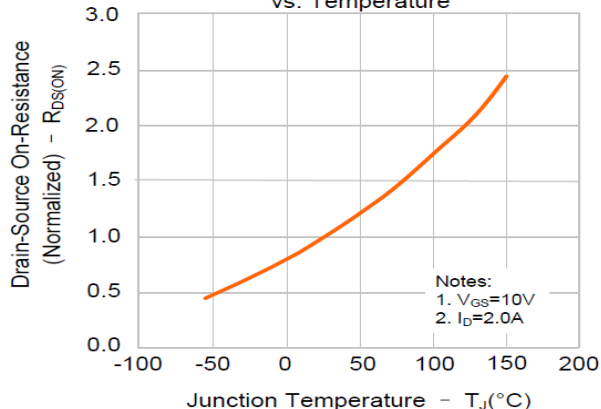


Figure 9 Max. Safe Operating Area

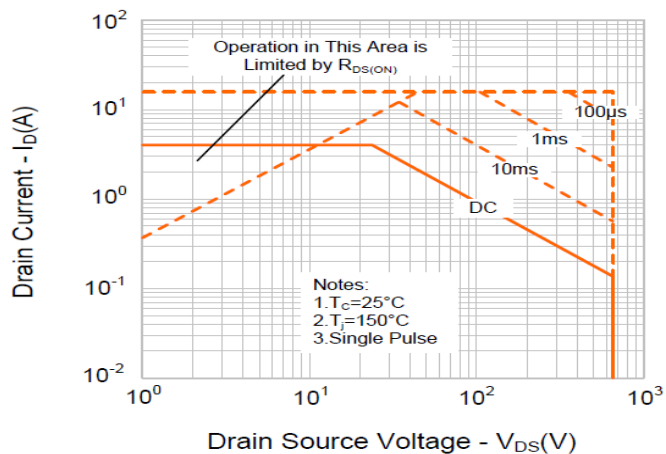
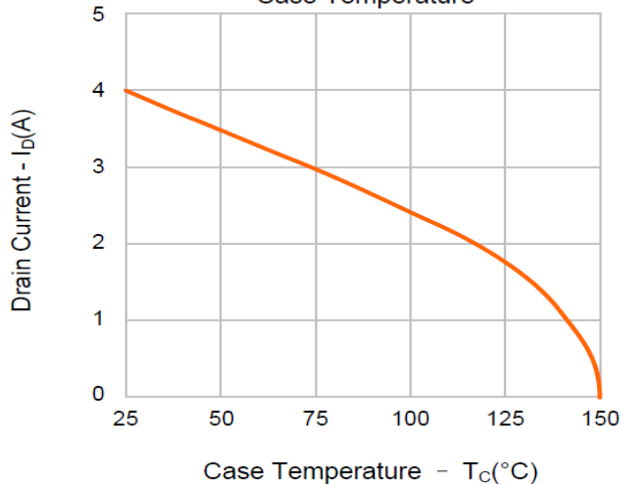
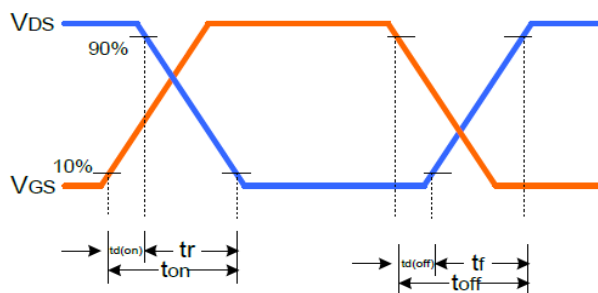
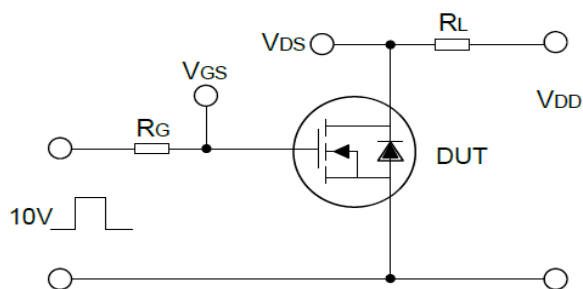


Figure 10. Maximum Drain Current vs. Case Temperature

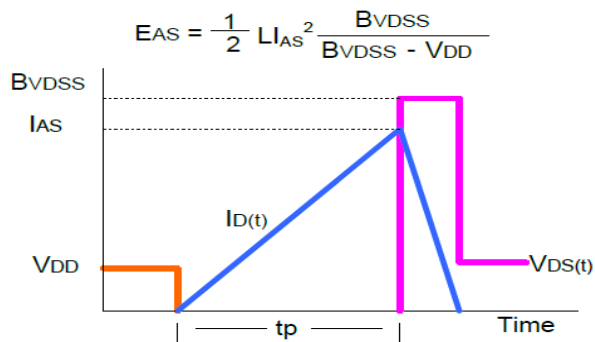
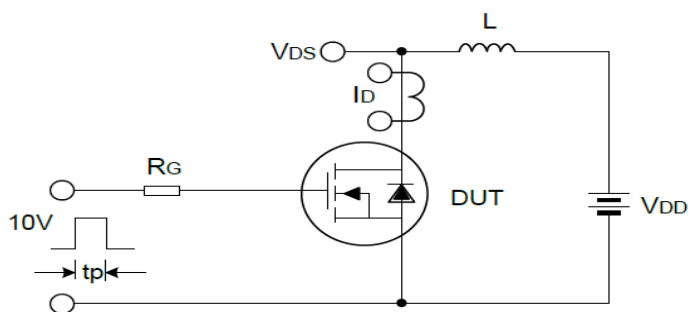


**TYPICAL TEST CURVES**

Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Gate Charge Test Circuit & Waveform

