650V 360mohm Super-Junction Power MOSFET
AKS65N3K6FM

Description:

This SJ device provides good FOM performance, better EMI for customer application.

Features:

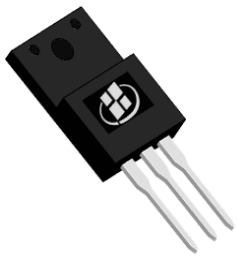
- Low FOM $R_{DS(ON)}$×Q_G
- Better EMI
- 100% UIS tested
- RoHS compliant (Note 1)
- Halogen-free (Note 1)

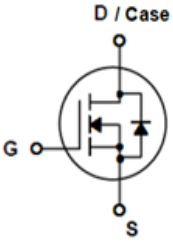
Applications:

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	650	V
$R_{DSON,\ max}$ @V_{GS} = 10V	360	mΩ
I_D	11	A





Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKS65N3K6FM	TO-220F	S65N3K6FM	Tube	1000PCS

Notes:

1. Contact ALKAIDSEMI sales for detail information

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	650	V
I_D	Drain Current - Continuous (T_C = 25°C) (Note 1)	11	A
	Drain Current - Continuous (T_C = 100°C)	7	A
I_{DM}	Drain Current - Pulsed (Note 2)	33	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	80	mJ
P_D	Power Dissipation (T_C = 25°C)	23	W
dV/dT	MOSFET dv/dt ruggedness	130	V/ns
	Reverse diode dv/dt	33	
$T_{J,}$ T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case， Steady-State	5.4	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient， Steady-State (Note 4)	55	°C/W

Notes:

1. The max drain current limited by maximum junction temperature
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 10 mH, V_{DD} = 150V, I_{AS} = 4A, R_G = 25 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	650			V
		V_{GS} = 0 V, I_D = 250 μA T_J = 150°C	700			
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V,			1	μA
		V_{DS} = 650 V, V_{GS} = 0 V, T_J = 150°C			100	
I_{GSS}	Gate Leakage Current	V_{GS} = ± 30 V, V_{DS} = 0 V			±100	nA
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.5	3.5	4.5	V
$R_{DS(ON)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 5.5 A		280	360	mΩ
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V, F = 1 MHz		841		pF
C_{OSS}	Output Capacitance			45.1		pF
C_{RSS}	Reverse Transfer Capacitance			2.8		pF
R_G	Gate Resistance	F = 1 MHz		5		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 520V , I_D = 5.5A, V_{GS} = 10V, R_G = 25Ω		18.2		nS
T_R	Rise Time			25.8		nS
$T_{D(OFF)}$	Turn Off Delay Time			81.8		nS
T_F	Fall Time			26.8		nS
Q_G	Total Gate Charge	V_{DD} = 520V , I_D = 5.5A, V_{GS} = 10V		23.3		nC
Q_{GS}	Gate-Source Charge			5.5		nC
Q_{GD}	Gate-Drain Charge			9.7		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current			11		A
I_{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 1)			33		A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 11 A		0.85		V
T_{RR}	Reverse recovery time	V_{DD} = 100V, I_D = 5.5A, di/dt = 100A/μS		250		ns
Q_{RR}	Reverse recovery charge			2.55		μC
I_{RRM}	Peak Reverse Recovery Current			-22.3		A

Electrical Characteristics Diagrams

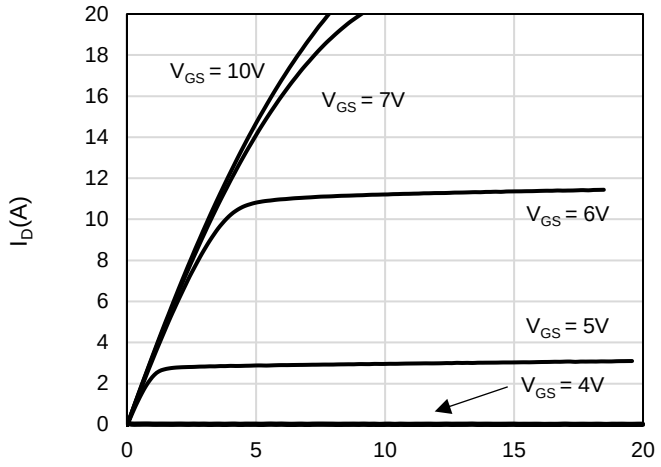


Figure 1: On-Region Characteristics

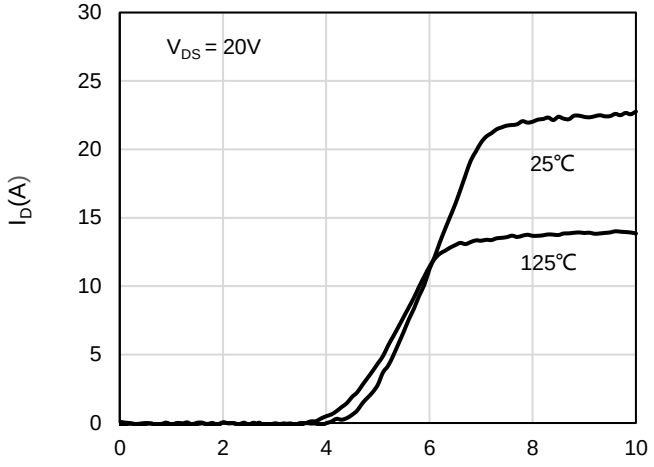


Figure 2: Transfer Characteristics

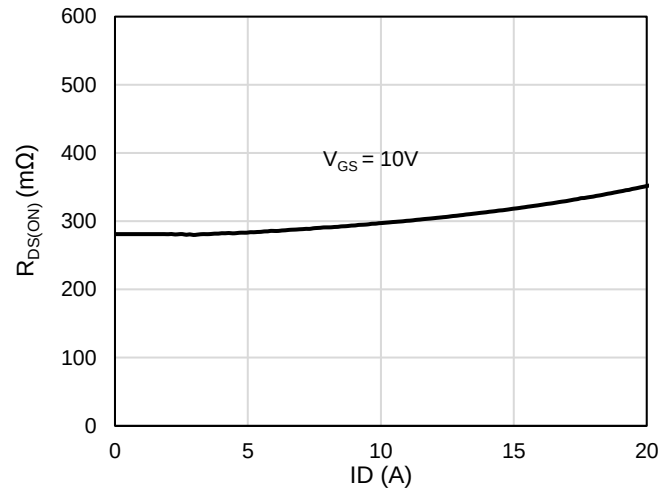


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

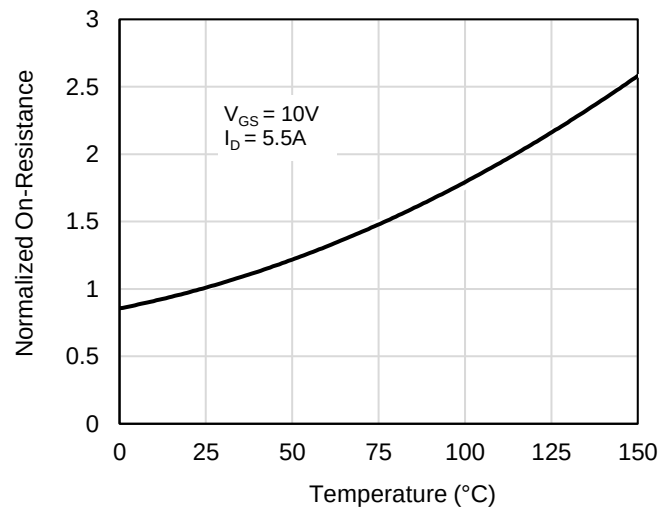


Figure 4: On-Resistance vs. Junction Temperature

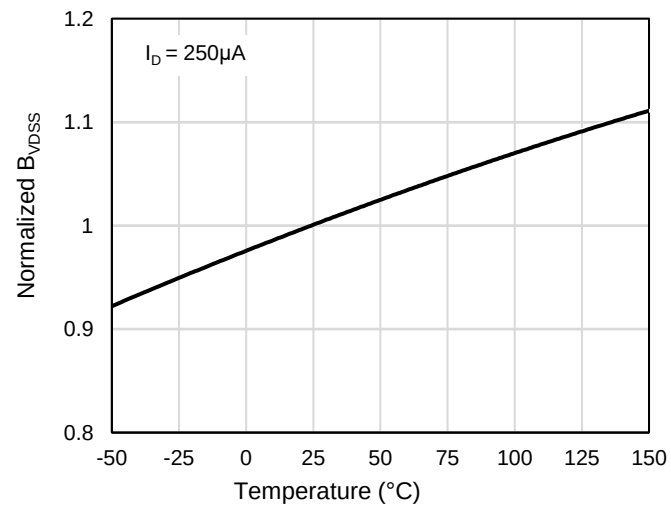


Figure 5: Breakdown Voltage vs. Junction Temperature

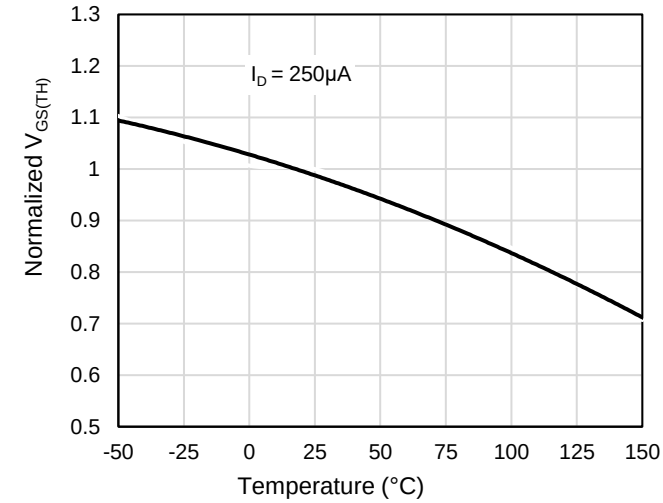


Figure 6: Threshold Voltage vs. Junction Temperature

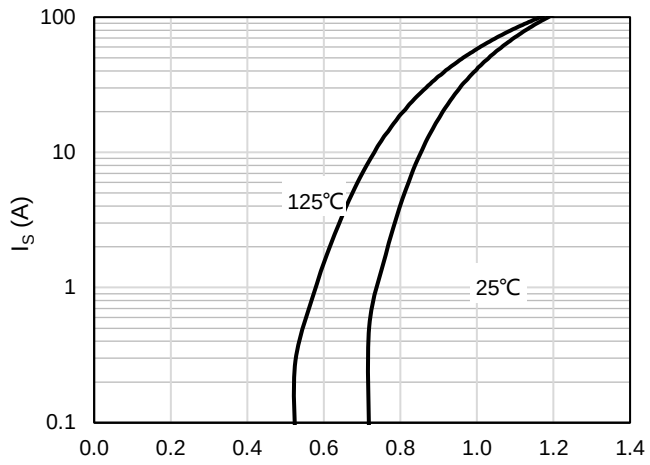


Figure 7: Body-Diode Characteristics

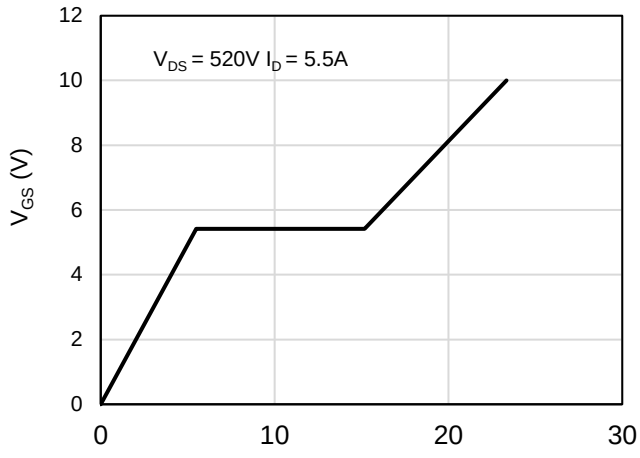


Figure 8: Gate-Charge Characteristics

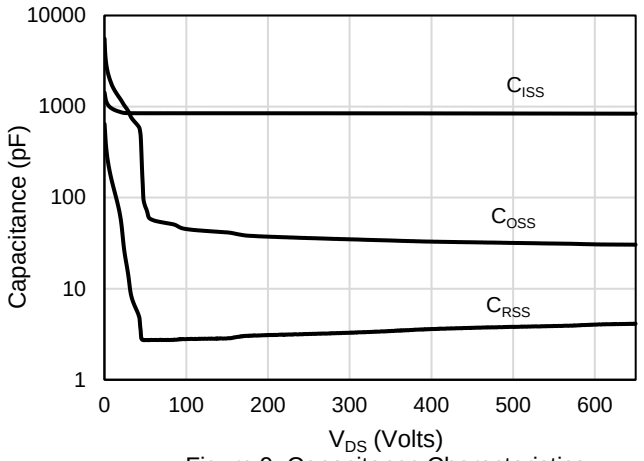


Figure 9: Capacitance Characteristics

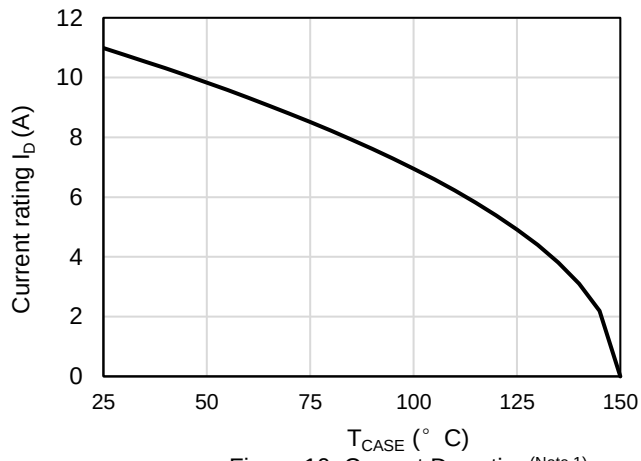


Figure 10: Current De-rating(Note 1)

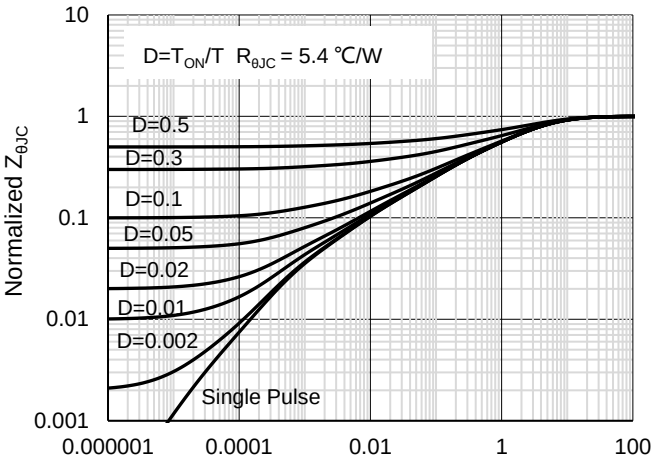


Figure 11: Normalized Maximum Transient Thermal Impedance

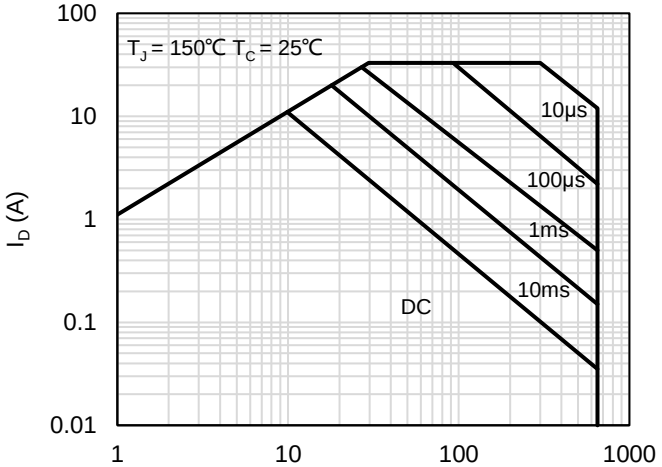
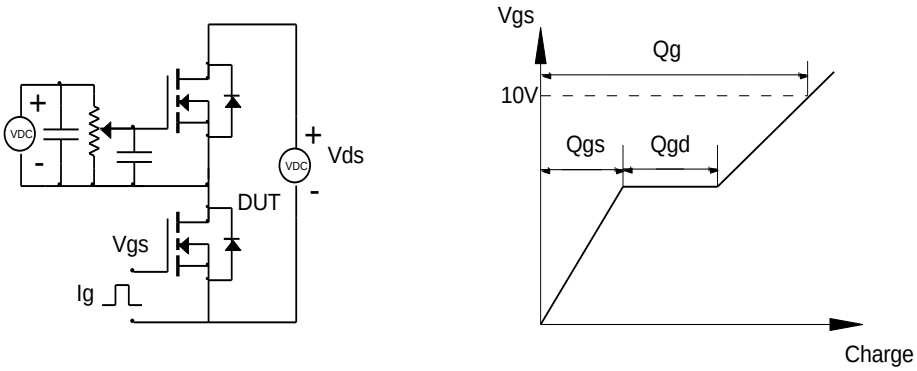


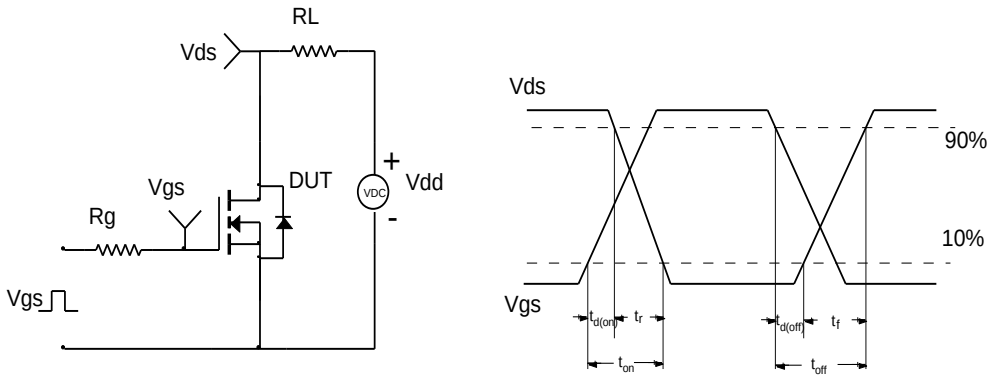
Figure 12: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

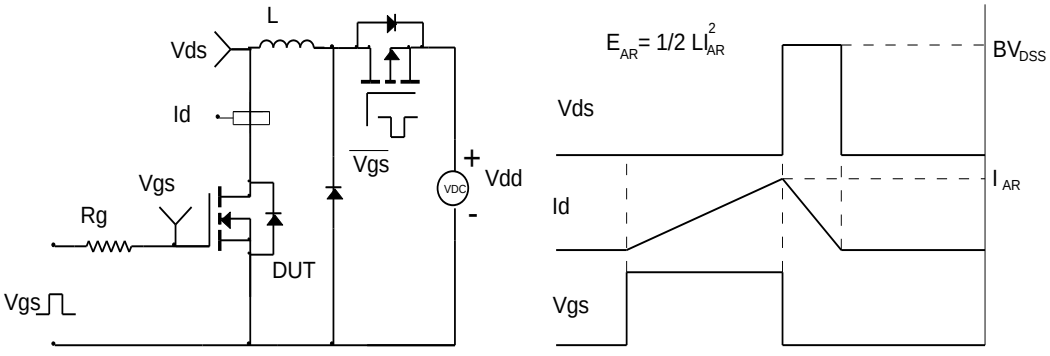
Gate Charge Test Circuit & Waveform



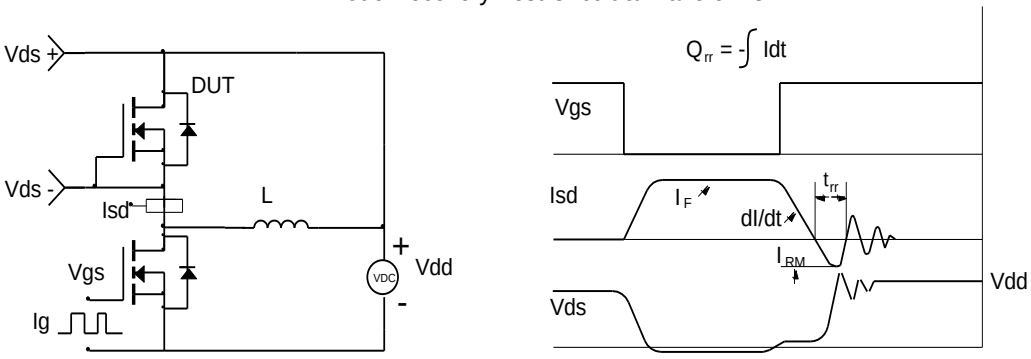
Resistive Switching Test Circuit & Waveforms



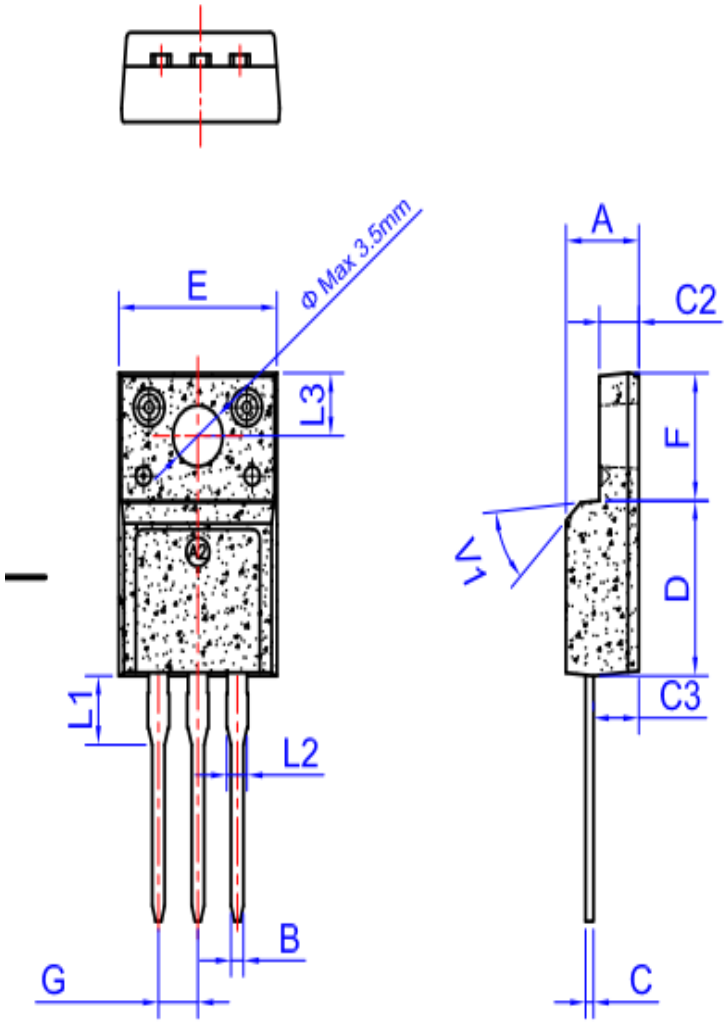
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50		4.90	0.177		0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.60		3.00	0.102		0.118
D	8.80		9.30	0.346		0.366
E	9.80		10.4	0.386		0.410
F	6.40		6.80	0.252		0.268
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.63			0.143	
L2	1.14		1.70	0.045		0.067
L3		3.30			0.130	
V1		45°			45°	

Marking Information

Note:
S65N3K6FM = Product Name Code
XXXXXXX = Date code
Contact ALKAIDSEMI sales for detail information

Revision History

Revision	Release Date	Remark
Rev.1.1	2022/3/10	

Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Alkaidsemi assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.