

12V 5.5mohm N-channel Trench MOSFET AKT1A055MBU

Description:

This N channel Trench MOSFET has been designed to Battery Protection.

Features:

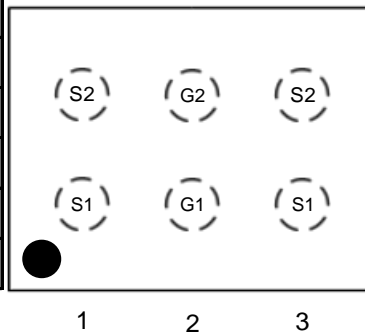
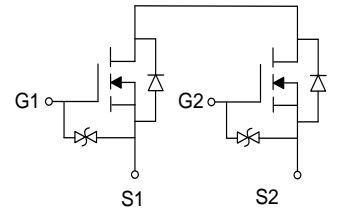
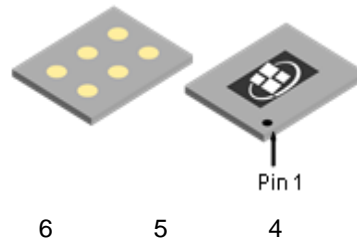
- Trench MOSFET technology
- Extremely Low $R_{SS(ON)}$
- ESD HBM Class 2
- Common Drain Design
- RoHS compliant ^(Note 1)
- Halogen-free ^(Note 1)

Applications:

- Battery Protection

Key Performance Parameters:

Parameter	Value	Unit
V_{SS}	12	V
$R_{SSON, max} @V_{GS} = 4.5V$	5.5	mΩ
$R_{SSON, max} @V_{GS} = 3.8V$	6.2	mΩ
$R_{SSON, max} @V_{GS} = 3.1V$	7.5	mΩ
$R_{SSON, max} @V_{GS} = 2.5V$	12	mΩ



Device	Pin Name	Pin Number
MOSFET 1	Gate 1	2
	Source 1	1 3
MOSFET 2	Gate 2	5
	Source 2	4 6

Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKT1A055MBU	CSP-2.14X1.67-6L	T1A055MBU	Tape Reel	5000PCS

Notes:

1. Contact ALKAIDSEMI sales for detail information

Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{SS}	Source-Source Voltage	12	V
I_S	Source Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 1)	7.5	A
	Source Current - Continuous ($T_C = 100^\circ\text{C}$)	4.5	A
I_{SM}	Source Current - Pulsed ^(Note 2)	30	A
V_{GS}	Gate-Source Voltage	± 8	V
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	0.5	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State	250	$^\circ\text{C/W}$

Notes:

1. Continuous current based on $R_{\theta JA}$
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. Mount on 1 - inch² FR - 4, 2oz copper PCB board

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV_{SSS}	Source-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	12			V
I_{SSS}	Zero Gate Voltage Source Current	$V_{SS} = 12\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = \pm 8\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
$V_{GS(TH)}$	Gate Threshold voltage	$V_{SS} = V_{GS}, I_D = 1\text{ mA}$	0.55	0.95	1.35	V
$R_{SS(ON)}$	Source-Source on-state resistance	$V_{GS} = 4.5\text{ V}, I_D = 4\text{ A}$		4.4	5.5	$\text{m}\Omega$
		$V_{GS} = 3.8\text{ V}, I_D = 4\text{ A}$		4.9	6.2	$\text{m}\Omega$
		$V_{GS} = 3.1\text{ V}, I_D = 4\text{ A}$		5.9	7.5	$\text{m}\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 4\text{ A}$		8.7	12	$\text{m}\Omega$
Dynamic Characteristics						
C_{ISS}	Input Capacitance	$V_{SS} = 10\text{ V}, V_{GS} = 0\text{ V}, F = 1\text{ MHz}$		750		pF
C_{OSS}	Output Capacitance			440		pF
C_{RSS}	Reverse Transfer Capacitance			15		pF
R_G	Gate Resistance	$F = 1\text{ MHz}$		501		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 6\text{ V}, R_L = 1.5\ \Omega, V_{GS} = 4.5\text{ V}, R_G = 3\ \Omega$		3.9		nS
T_R	Rise Time			4.9		nS
$T_{D(OFF)}$	Turn Off Delay Time			12.2		nS
T_F	Fall Time			7.8		nS
Q_G	Total Gate Charge	$V_{DD} = 6\text{ V}, I_S = 4\text{ A}, V_{GS} = 4.5\text{ V}$		22		nC
Q_{GS}	Gate-Source Charge			5		nC
Q_{GD}	Gate-Drain Charge			8		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				7.5	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)				30	A
V_{SS}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 4\text{ A}$		0.73	1.2	V

Electrical Characteristics Diagrams

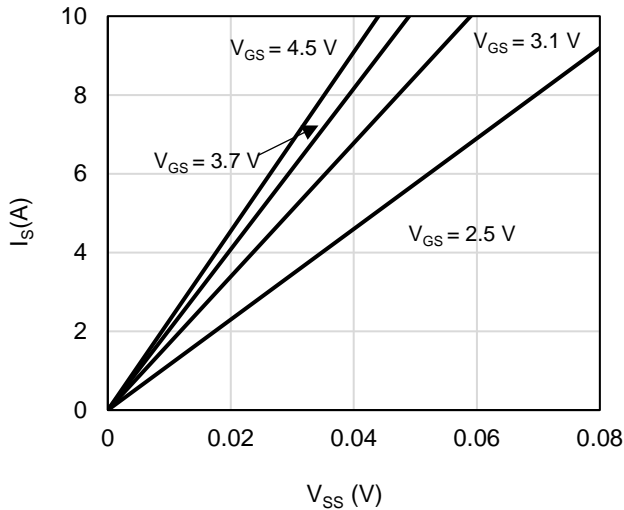


Figure 1: On-Region Characteristics

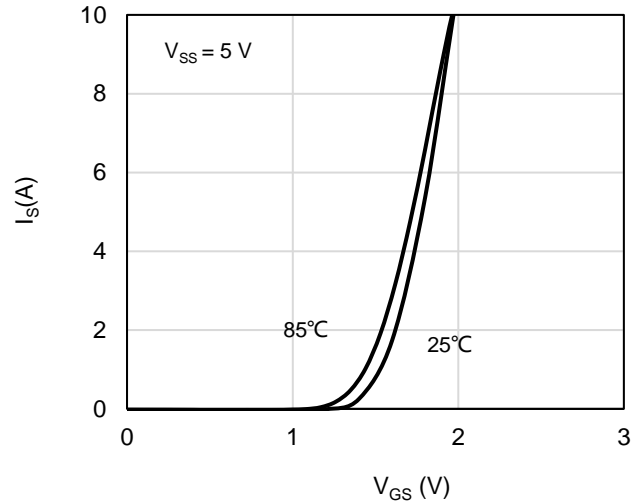


Figure 2: Transfer Characteristics

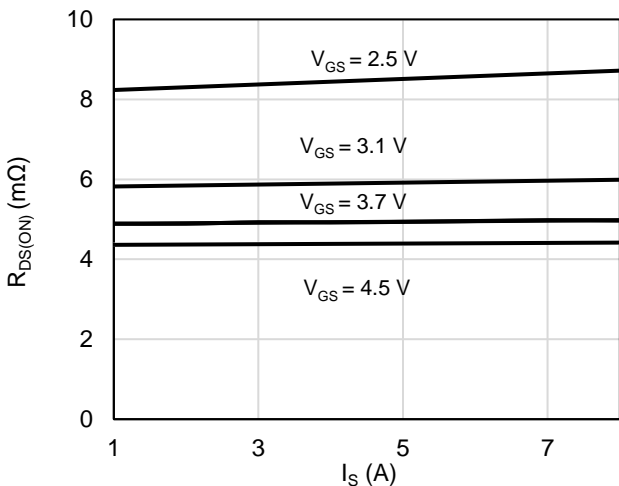


Figure 3: On-Resistance vs. Source Current and Gate Voltage

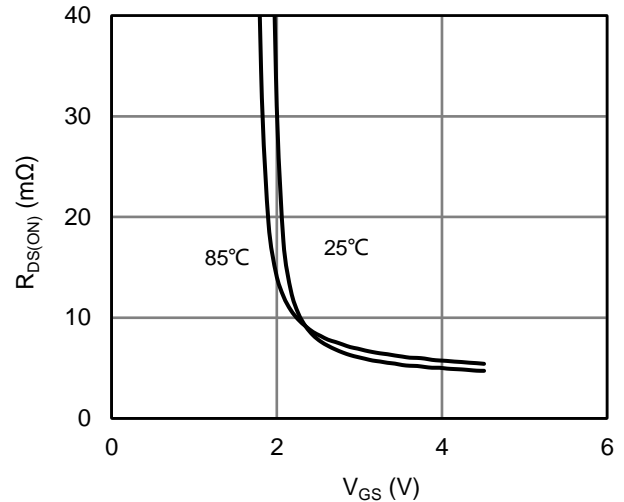


Figure 4: On-Resistance vs. Gate-Source Voltage

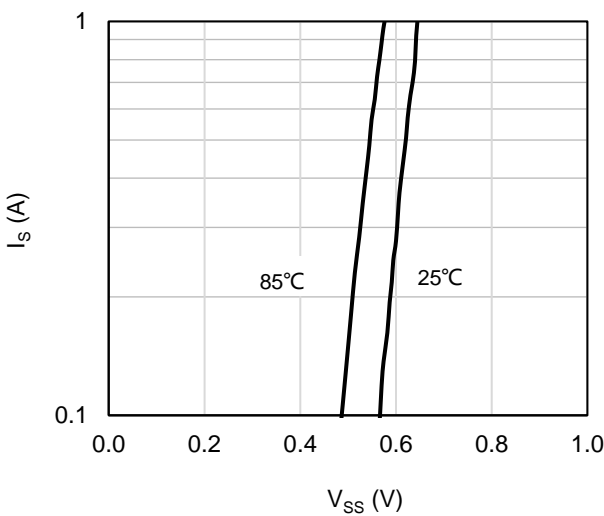


Figure 5: Body-Diode Characteristics

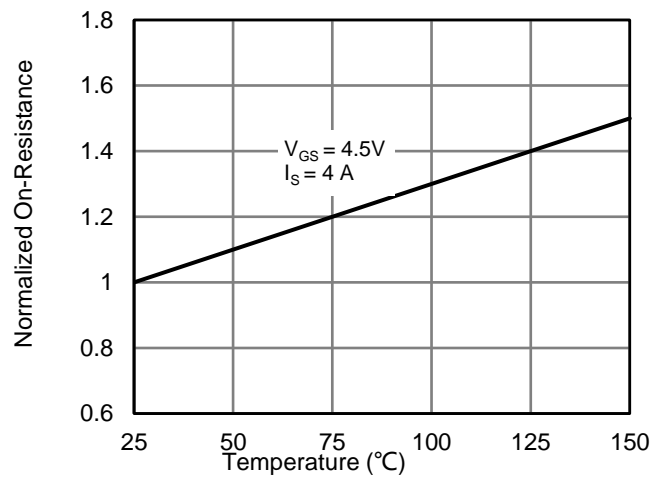
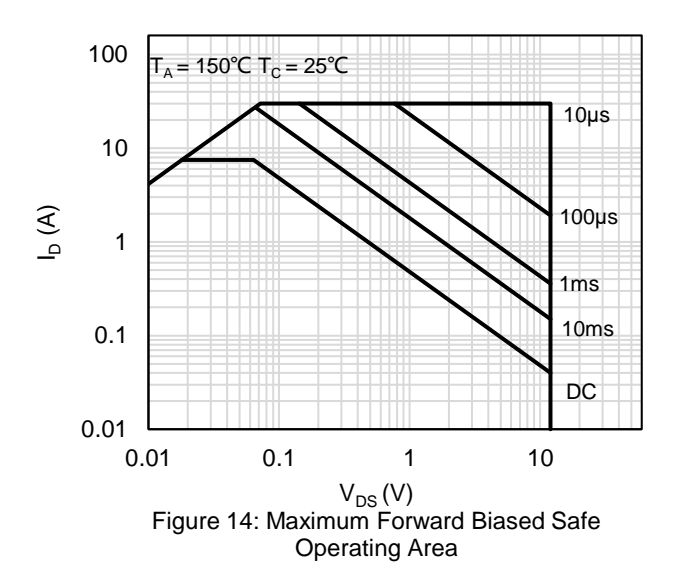
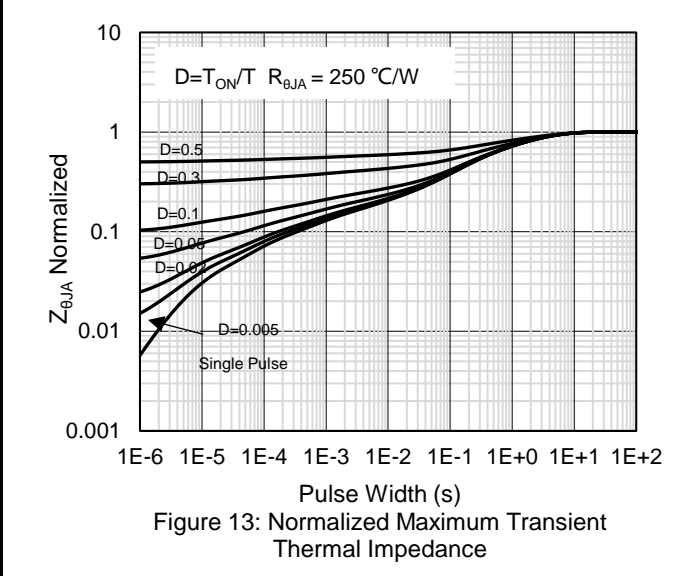
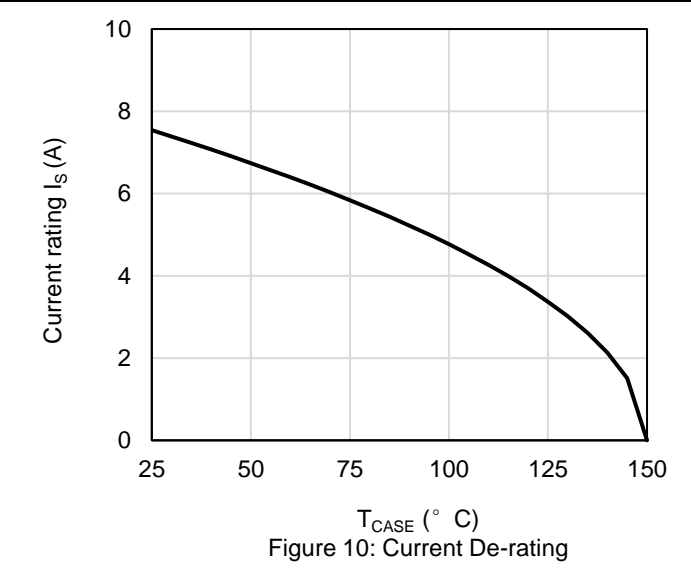
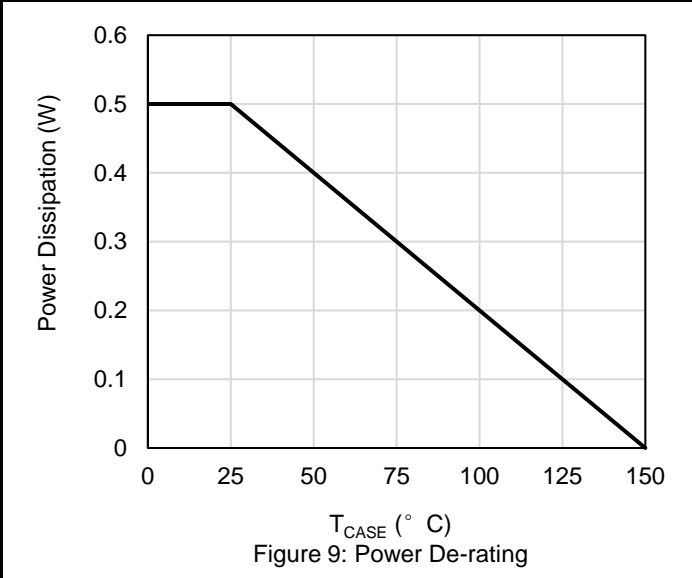
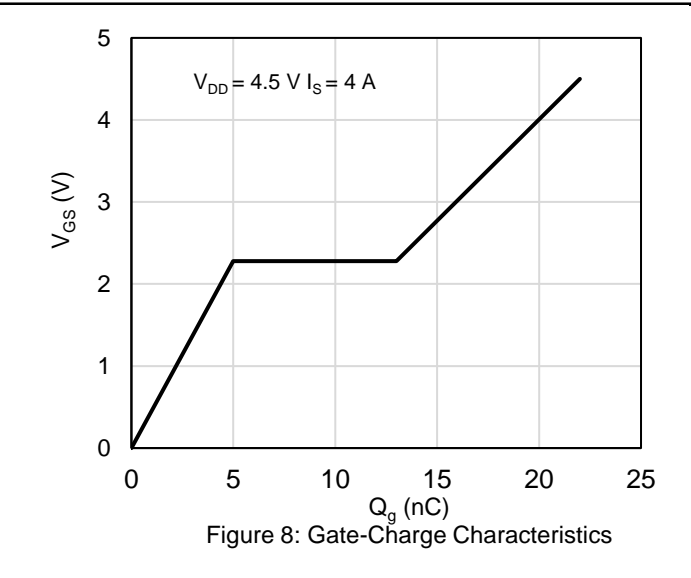
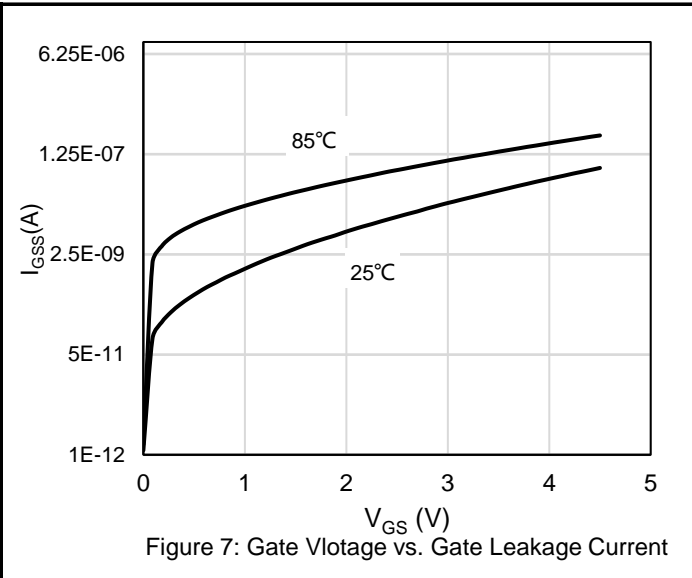
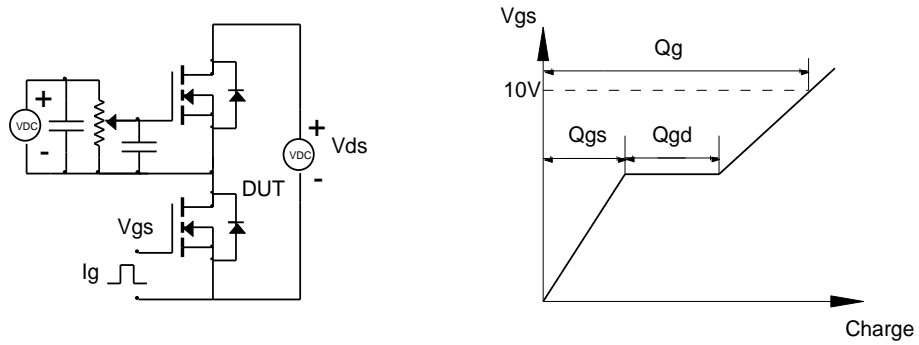


Figure 6: On-Resistance vs. Junction Temperature

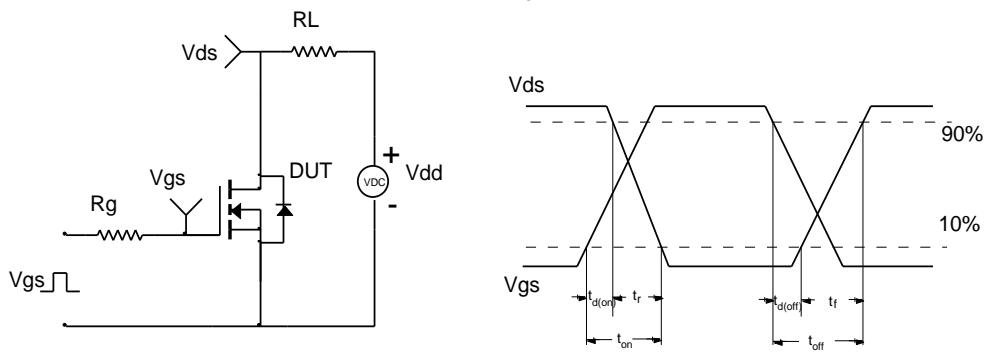


Test Circuit and Waveform

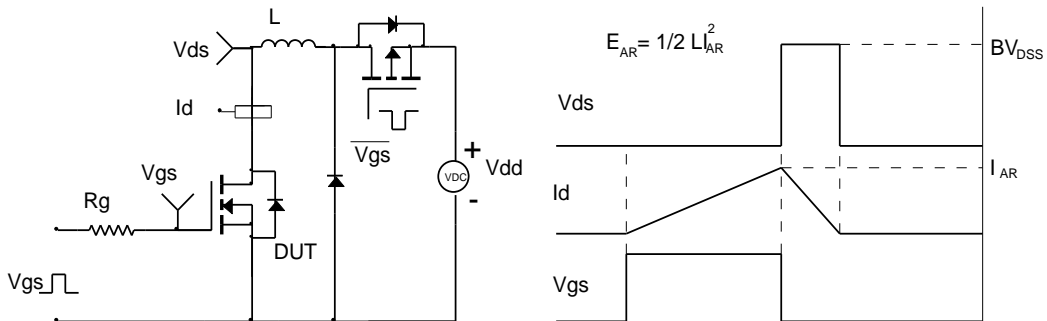
Gate Charge Test Circuit & Waveform



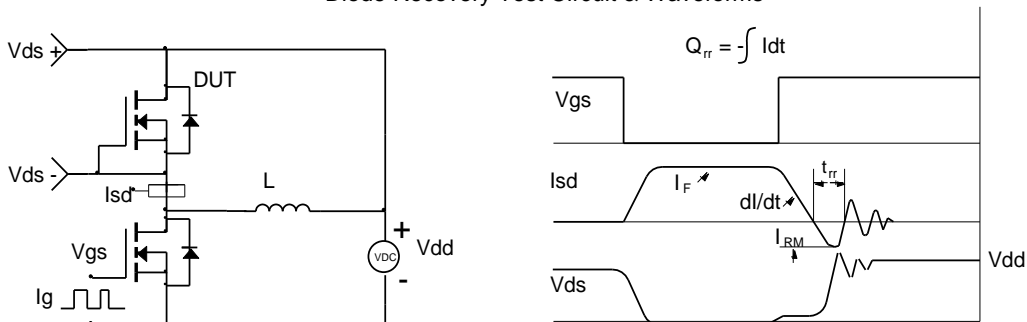
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

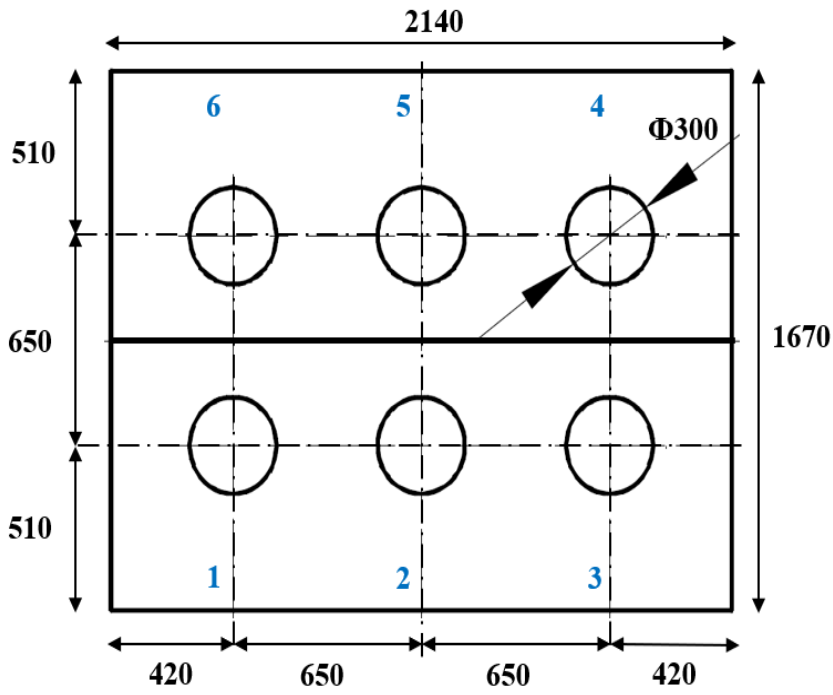


Diode Recovery Test Circuit & Waveforms

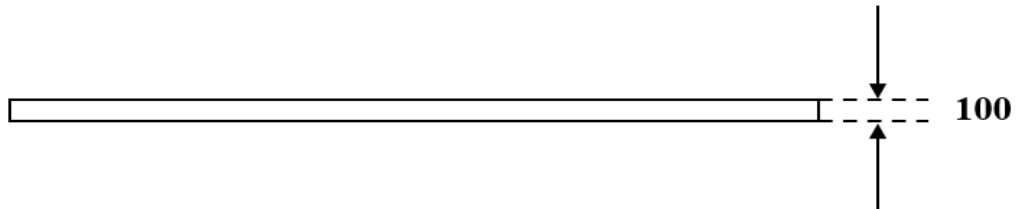


Package Outline

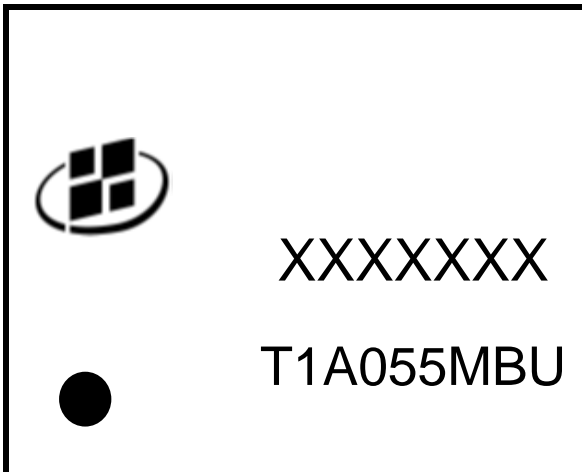
Bottom View



Side View



Marking Information



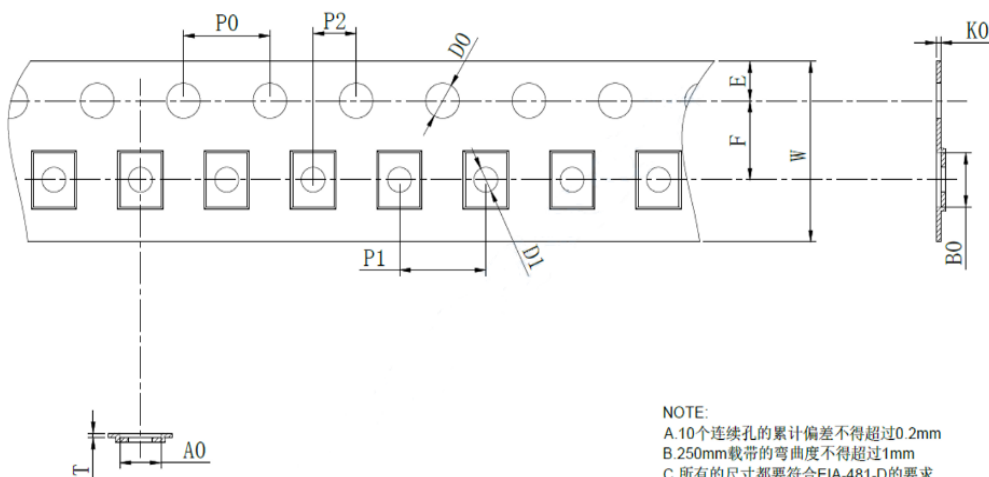
Note:

T1A055MBU = Product Name Code

XXXXXXXX = Date code

Contact ALKAIDSEMI sales for detail information

Reel and Tube Information



NOTE:

- A. 10个连续孔的累计偏差不得超过0.2mm
- B. 250mm载带的弯曲度不得超过1mm
- C. 所有的尺寸都要符合EIA-481-D的要求
- D. K0的尺寸为型腔内底部到载带上表面距离
- E. 材料: EC-AP2
- F. A0&B0的测量位置在载带型腔最底部.
- G. 依据芯片尺寸绘制.
- H. 供应商内部载带名称为“1621”

SYMBOL	A0	B0	K0	P0	P1	P2
SPEC	1.90±0.05	2.40±0.05	0.21±0.05	4.00±0.10	4.00±0.10	2.00±0.05
SYMBOL	T	E	F	D0	D1	W
SPEC	0.20±0.05	1.75±0.10	3.50±0.05	1.55±0.10	1.10±0.10	8.00 ^{+0.3} _{-0.1}

Revision History

Revision	Release Date	Remark
Rev.1.0	2022/7/6	Initial Release

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.