

# 100V 7.7mohm N-channel SGT MOSFET

## AKG100N077G

### Description:

The N channel SGT MOSFET has designed to very low on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, especially for high efficiency power-management applications.

### Features:

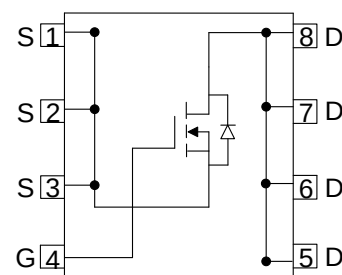
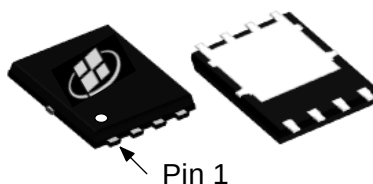
- N-channel, optimized for high-speed smooth switching
- Excellent Gate Charge  $\times R_{DS(on)}$  (FOM)
- Very low on-resistance
- RoHS compliant (Note 1)
- Halogen-free (Note 1)

### Applications:

- DC-DC Converter
- Power Management
- Motor Drivers
- Load Switching

### Key Performance Parameters:

| Parameter                     | Value | Unit       |
|-------------------------------|-------|------------|
| $V_{DS}$                      | 100   | V          |
| $R_{DS(on), max} @V_{GS}=10V$ | 7.7   | m $\Omega$ |
| $I_D$                         | 80    | A          |



### Ordering Information:

| Ordering Code | Package Type | Marking Code | Form           | Packing |
|---------------|--------------|--------------|----------------|---------|
| AKG100N077G   | PDFN5X6-8L   | G100N077G    | 13 inches Reel | 5000    |

### Notes:

1. Contact ALKAIDSEMI sales for detail information

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

| Symbol         | Parameter                                                        | Value       | Units            |
|----------------|------------------------------------------------------------------|-------------|------------------|
| $V_{DS}$       | Drain-Source Voltage                                             | 100         | V                |
| $I_D$          | Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) (Note 1) | 80          | A                |
|                | Drain Current - Continuous ( $T_C = 100^\circ\text{C}$ )         | 50          | A                |
|                | Drain Current - Continuous (package limited)                     | 60          | A                |
| $I_{DM}$       | Drain Current - Pulsed (Note 2)                                  | 240         | A                |
| $V_{GS}$       | Gate-Source Voltage                                              | $\pm 20$    | V                |
| $E_{AS}$       | Single Pulsed Avalanche Energy (Note 3)                          | 27.5        | mJ               |
| $P_D$          | Power Dissipation ( $T_C = 25^\circ\text{C}$ )                   | 52          | W                |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                          | -55 to +150 | $^\circ\text{C}$ |

**Thermal Characteristics**

| Symbol          | Parameter                                                     | Value | Units              |
|-----------------|---------------------------------------------------------------|-------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case, Steady-State            | 1.5   | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient Steady State (Note 4) | 48    | $^\circ\text{C/W}$ |

**Notes:**

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3.  $L = 0.3\text{ mH}$ ,  $V_{DD} = 20\text{ V}$ ,  $I_{AS} = 10.5\text{ A}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$
4. Mount on minimum PCB layout

## Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise noted)

| Symbol                                                 | Parameter                                                     | Test Conditions                                                                              | Min | Typ  | Max  | Units |
|--------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----|------|------|-------|
| Static Characteristics                                 |                                                               |                                                                                              |     |      |      |       |
| BV <sub>DSS</sub>                                      | Drain-Source Breakdown Voltage                                | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA                                               | 100 |      |      | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                               | V <sub>DS</sub> = 80 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 25°C                         |     |      | 1    | μA    |
| I <sub>GSS</sub>                                       | Gate Leakage Current                                          | V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V                                               |     |      | ±100 | nA    |
| V <sub>GS(TH)</sub>                                    | Gate Threshold voltage                                        | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                  | 1.3 | 2    | 2.5  | V     |
| R <sub>DS(On)</sub>                                    | Drain-Source on-state resistance                              | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A                                                |     | 6.4  | 7.7  | mΩ    |
|                                                        |                                                               | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A                                               |     | 9.2  | 11.4 |       |
| Dynamic Characteristics                                |                                                               |                                                                                              |     |      |      |       |
| C <sub>ISS</sub>                                       | Input capacitance                                             | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, F = 1 MHz                                     |     | 2945 |      | pF    |
| C <sub>OSS</sub>                                       | Output capacitance                                            |                                                                                              |     | 737  |      | pF    |
| C <sub>RSS</sub>                                       | Reverse transfer capacitance                                  |                                                                                              |     | 2.05 |      | pF    |
| R <sub>G</sub>                                         | Gate resistance                                               | F = 1 MHz                                                                                    |     | 3.2  |      | Ω     |
| Switching Characteristics                              |                                                               |                                                                                              |     |      |      |       |
| T <sub>D(ON)</sub>                                     | Turn On Delay Time                                            | V <sub>DS</sub> = 50 V, I <sub>D</sub> =13 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω |     | 14   |      | ns    |
| T <sub>R</sub>                                         | Rise Time                                                     |                                                                                              |     | 28.5 |      | ns    |
| T <sub>D(OFF)</sub>                                    | Turn Off Delay Time                                           |                                                                                              |     | 46.5 |      | ns    |
| T <sub>F</sub>                                         | Fall Time                                                     |                                                                                              |     | 42.5 |      | ns    |
| Q <sub>G</sub>                                         | Total Gate Charge                                             | V <sub>DS</sub> = 50 V, I <sub>D</sub> = 13 A, V <sub>GS</sub> = 10 V                        |     | 39.5 |      | nC    |
| Q <sub>GS</sub>                                        | Gate-Source Charge                                            |                                                                                              |     | 6.6  |      | nC    |
| Q <sub>GD</sub>                                        | Gate-Drain Charge                                             |                                                                                              |     | 8.6  |      | nC    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                               |                                                                                              |     |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Body-Diode Forward Current                 |                                                                                              |     |      | 63   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Body-Diode Forward Current <sup>(NOTE 1)</sup> |                                                                                              |     |      | 252  | A     |
| V <sub>SD</sub>                                        | Diode Forward Voltage                                         | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1 A                                                  |     | 0.7  | 1    | V     |
| T <sub>RR</sub>                                        | Reverse recovery time                                         | I <sub>F</sub> = 13 A, di/dt = 100 A/μS                                                      |     | 177  |      | ns    |
| Q <sub>RR</sub>                                        | Reverse recovery charge                                       |                                                                                              |     | 1291 |      | nC    |

### Notes:

1. Pulse Test: Pulse width ≤ 300 μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

## Electrical Characteristics Diagrams

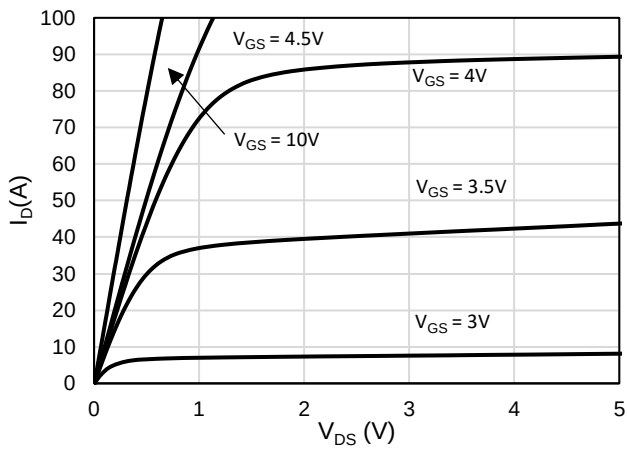


Figure 1: On-Region Characteristics

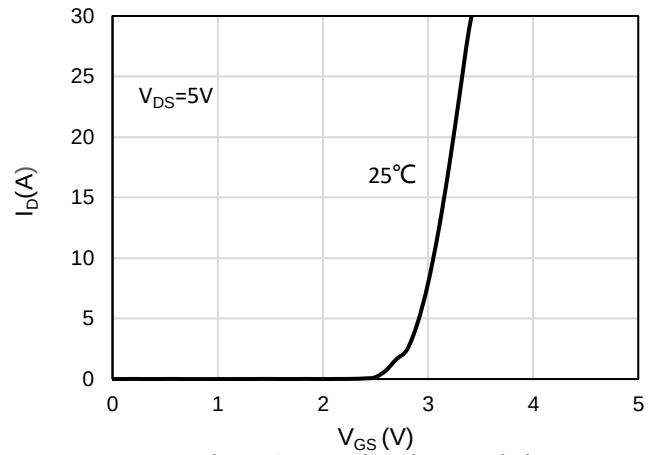


Figure 2: Transfer Characteristics

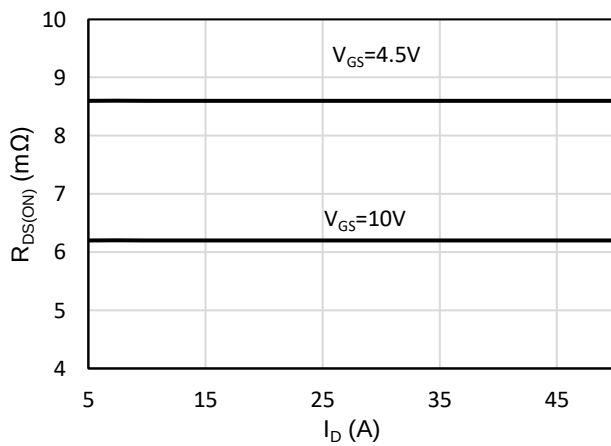


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

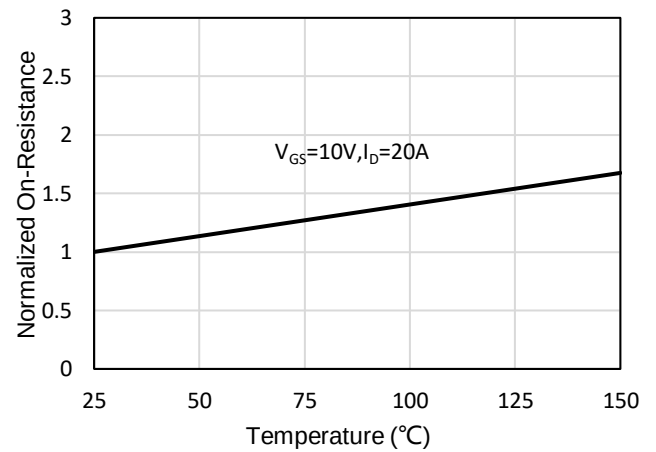


Figure 4: On-Resistance vs. Junction Temperature

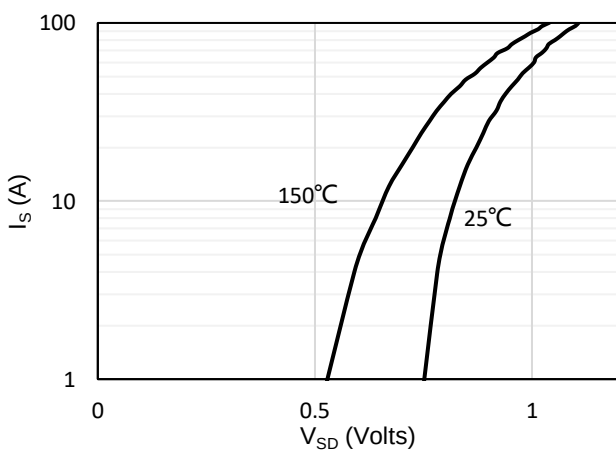


Figure 5: Body-Diode Characteristics

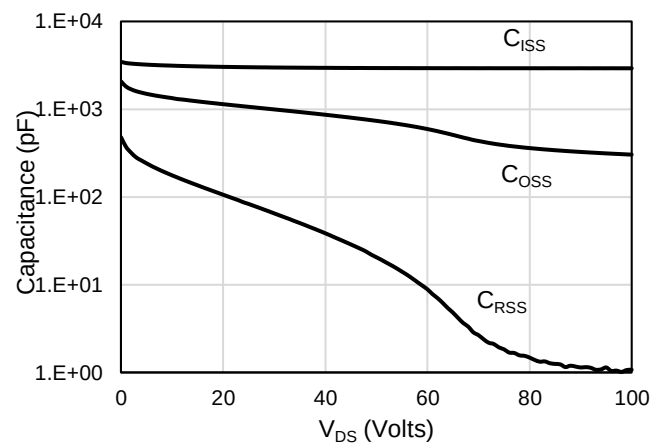


Figure 6: Capacitance Characteristics

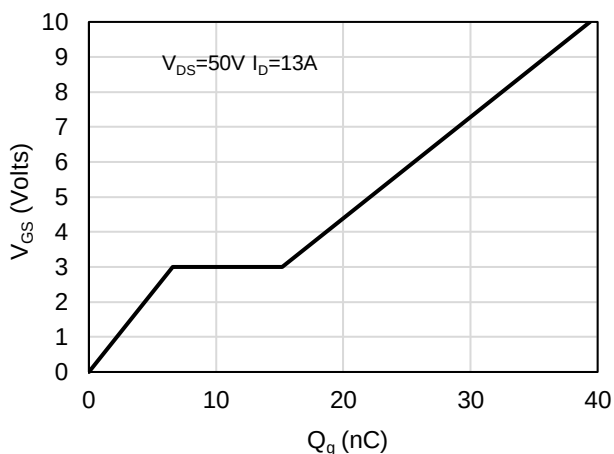


Figure 7: Gate-Charge Characteristics

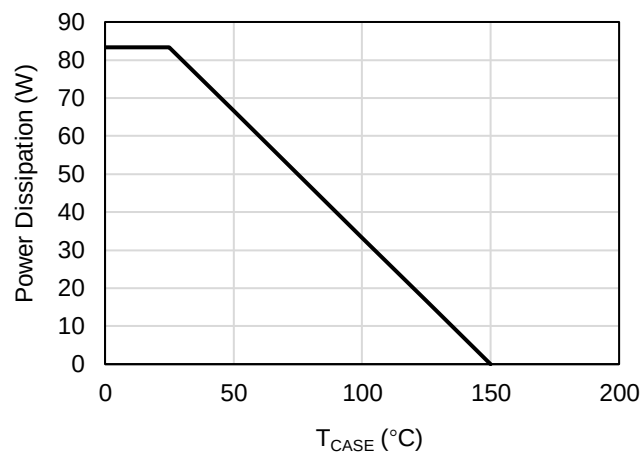


Figure 8: Power De-rating

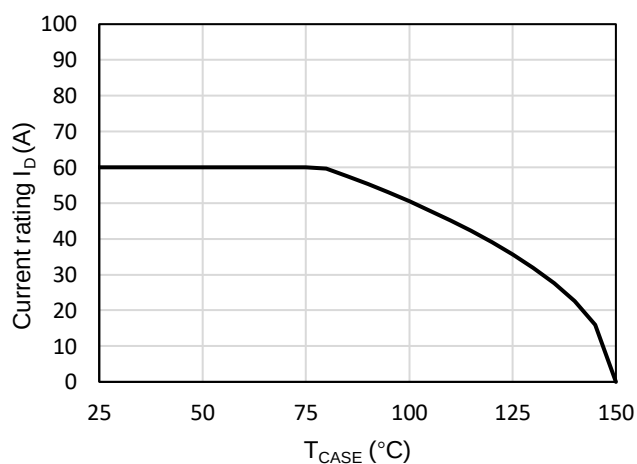


Figure 9: Current De-rating

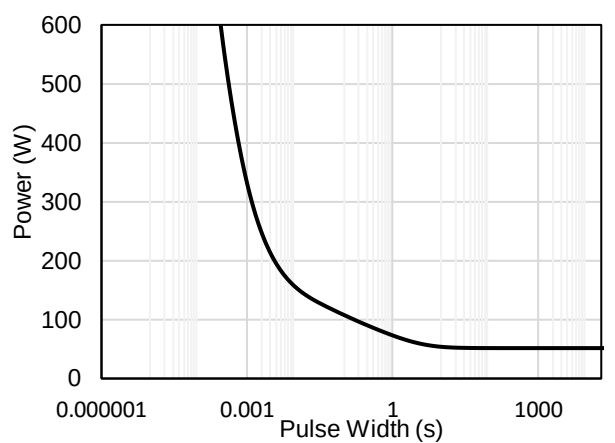


Figure 10: Single Pulse Power Rating Junction-to-Case

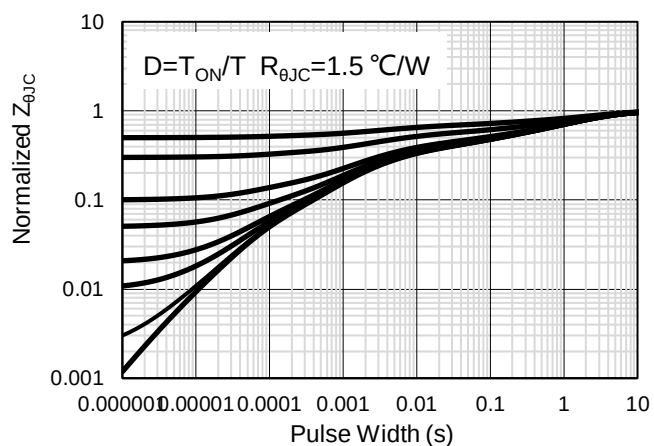


Figure 11: Normalized Maximum Transient Thermal Impedance

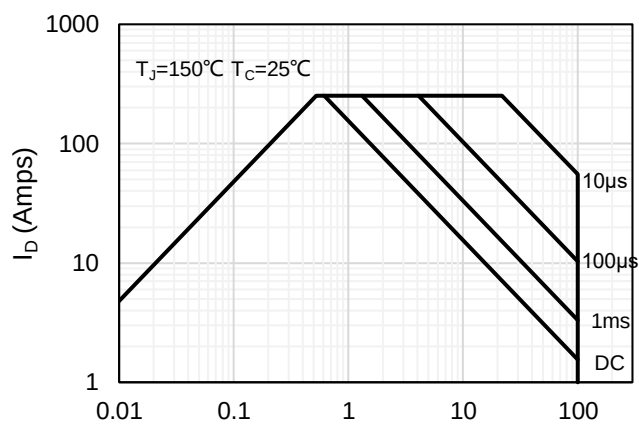
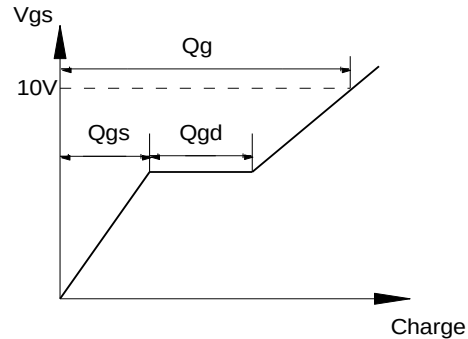
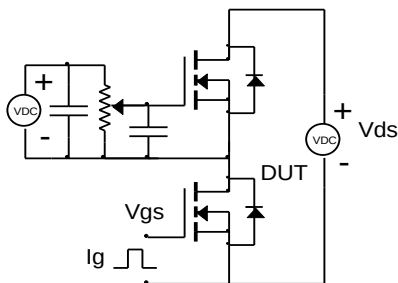


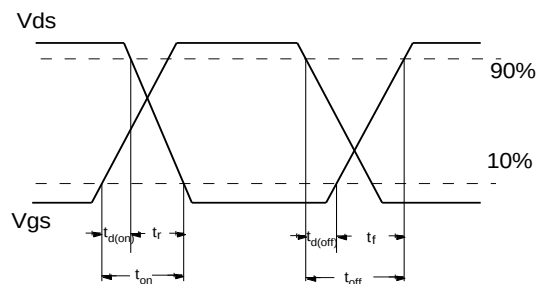
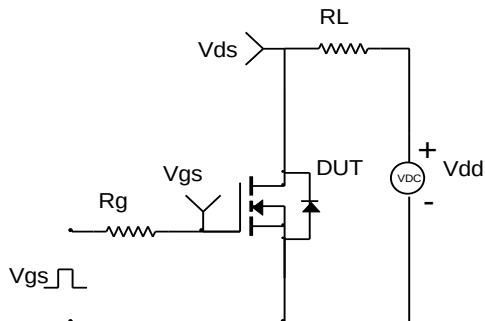
Figure 12: Maximum Forward Biased Safe Operating Area

## Test Circuit and Waveform

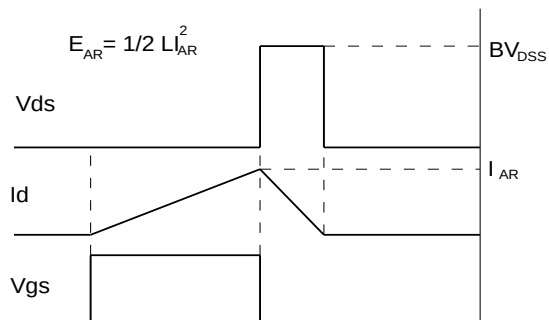
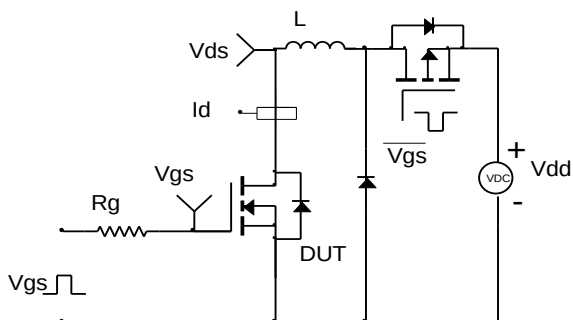
Gate Charge Test Circuit & Waveform



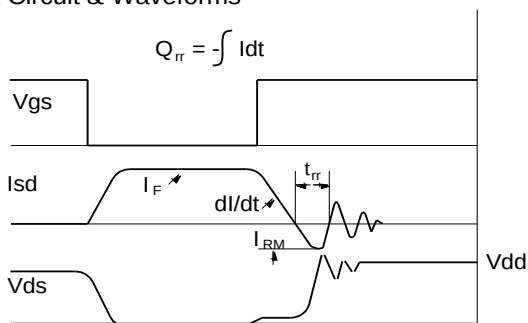
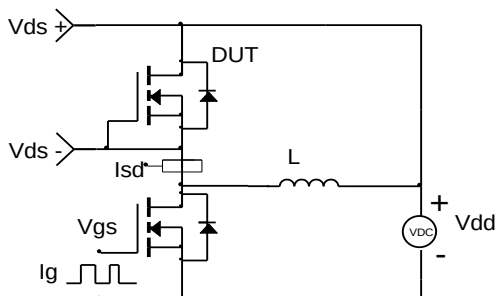
Resistive Switching Test Circuit & Waveforms



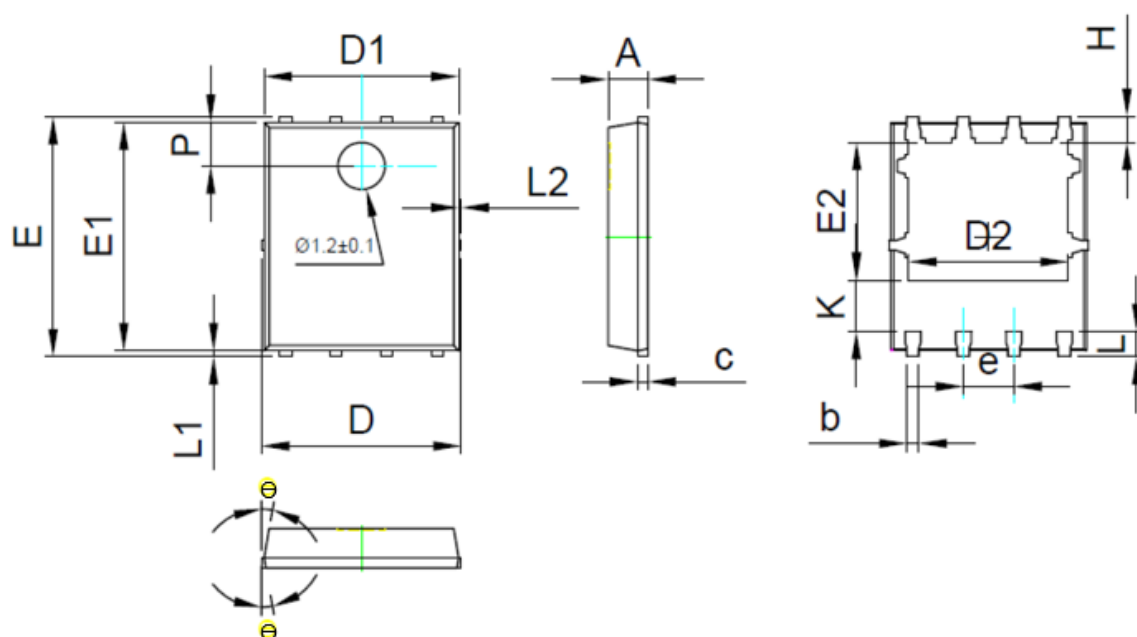
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



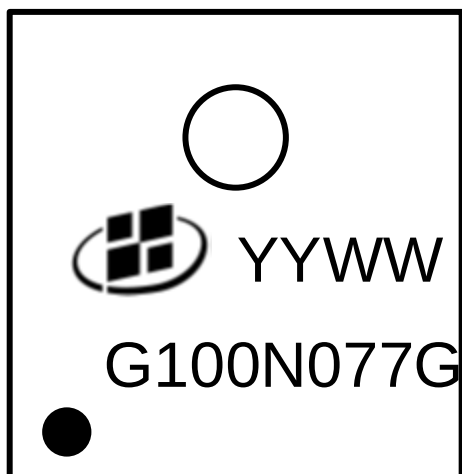
## Package Outlines



COMMON DIMENSIONS  
( UNITS OF MEASURE = MILLIMETER )

| SYMBOL   | MIN      | NOM   | MAX   |
|----------|----------|-------|-------|
| A        | 0.90     | 1.00  | 1.10  |
| b        | 0.35     | 0.40  | 0.45  |
| c        | 0.21     | 0.25  | 0.34  |
| D        | -        | -     | 5.1   |
| D1       | 4.85     | 4.90  | 4.95  |
| D2       | 3.96     | 4.01  | 4.06  |
| e        | 1.27 BSC |       |       |
| E        | 5.95     | 6.00  | 6.05  |
| E1       | 5.70     | 5.75  | 5.80  |
| E2       | 3.425    | 3.475 | 3.525 |
| H        | 0.60     | 0.65  | 0.70  |
| K        | 1.29     | -     | -     |
| L        | 0.60     | 0.65  | 0.70  |
| L1       | 0.05     | 0.15  | 0.25  |
| L2       | -        | -     | 0.12  |
| $\theta$ | 8°       | 10°   | 12°   |
| P        | 1.05     | 1.10  | 1.15  |

## Marking Information



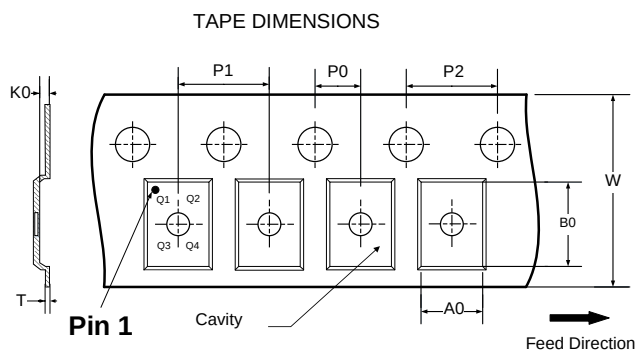
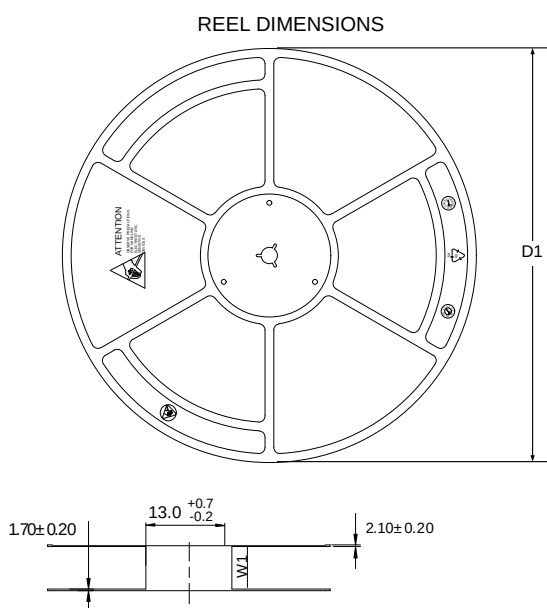
Note:

YYWW=Date code

G100N077G=Product Name Code

Contact ALKAIDSEMI sales for detail information

## Reel and Tube Information



A0: Dimension designed to accommodate the component width  
 B0: Dimension designed to accommodate the component length  
 K0: Dimension designed to accommodate the component thickness  
 W: Overall width of the carrier tape  
 P0: Pitch between successive cavity centers and sprocket hole  
 P1: Pitch between successive cavity centers  
 P2: Pitch between sprocket hole  
 T: Tape material thickness  
 D1: Reel Diameter  
 W1: Reel Width

| DIMENSIONS |     |      |    |    |     |     |     |      |                | (Unit: mm) |
|------------|-----|------|----|----|-----|-----|-----|------|----------------|------------|
| Reel       | D1  | W1   |    |    |     |     |     |      |                | Material   |
|            | 330 | 12.5 |    |    |     |     |     |      |                | Hips       |
| Tape       | P0  | P1   | P2 | W  | A0  | B0  | K0  | T    | Pin 1 Quadrant | Material   |
|            | 4   | 8    | 2  | 12 | 6.3 | 5.3 | 1.2 | 0.25 | Q1             | PC         |

All dimensions are nominal



## Revision History

| Revision | Release Date | Remark |
|----------|--------------|--------|
| Rev. 1.1 | 2021-12-19   |        |

## 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.

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