

• General Description

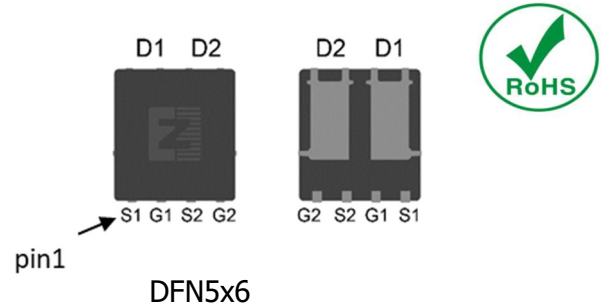
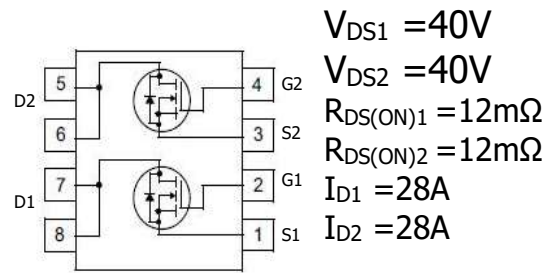
It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Dual DIE in one package

• Application

- Synchronous Rectification in DC/DC and AC/DC Converters
- Industrial and Motor Drive applications

• Product Summary

• Ordering Information:

| | |
|---------------------------|-----------|
| Part NO. | ZMD68403N |
| Marking | ZMD68403 |
| Packing Information | REEL TAPE |
| Basic ordering unit (pcs) | 3000 |

• Absolute Maximum Ratings ($T_c = 25^\circ C$)

| Parameter | Symbol | Rating | Unit |
|------------------------------------------------------------------------------------------|-------------------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current | $I_{D@T_C=25^\circ C}$ | 28 | A |
| | $I_{D@T_C=75^\circ C}$ | 21 | A |
| | $I_{D@T_C=100^\circ C}$ | 17.5 | A |
| Pulsed Drain Current ^① | I_{DM} | 84 | A |
| Total Power Dissipation | $P_D@T_C=25^\circ C$ | 73 | W |
| Total Power Dissipation | $P_D@T_A=25^\circ C$ | 2.5 | W |
| Operating Junction Temperature | T_J | -55 to 150 | $^\circ C$ |
| Storage Temperature | T_{STG} | -55 to 150 | $^\circ C$ |
| Single Pulse Avalanche Energy ($L=0.1mH, V_{GS}=10V, R_g=25\Omega, T_J=25^\circ C$) | E_{AS} | 27 | mJ |
| ESD Level (HBM) | | Class 1C | |

**•Thermal resistance**

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|----------------------------------------------|-------------------|------|------|------|-------|
| Thermal resistance, junction - case | R _{thJC} | - | - | 1.7 | ° C/W |
| Thermal resistance, junction - ambient | R _{thJA} | - | - | 50 | ° C/W |
| Soldering temperature, wavesoldering for 10s | T _{sold} | - | - | 265 | ° C |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|-----------------------------------|---------------------|------------------------------------------------------------|------|-----|------|------|
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} = 0V, I _D = 250uA | 40 | | | V |
| Gate Threshold Voltage | V _{GS(TH)} | V _{GS} = V _{DS} , I _D = 250uA | 1.4 | | 2.5 | V |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} = 40V, V _{GS} = 0V | | | 1.0 | uA |
| Gate- Source Leakage Current | I _{GSS} | V _{GS} = ±20V, V _{DS} = 0V | | | ±100 | nA |
| Static Drain-source On Resistance | R _{DS(ON)} | V _{GS} = 10V, I _D = 14A | | 12 | 16 | mΩ |
| | | V _{GS} = 4.5V, I _D = 10A | | 17 | 22 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} = 10V, I _D = 4A | | 7 | | s |

•Dynamic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|------------------------------|---------------------|------------------------------------------------------------------------------------------------|------|------|------|------|
| Input capacitance | C _{iss} | f = 1MHz V _{DS} = 25V | - | 1170 | - | pF |
| Output capacitance | C _{oss} | | - | 120 | - | |
| Reverse transfer capacitance | C _{rss} | | - | 92 | - | |
| Total gate charge | Q _g | V _{DD} = 25V I _D = 20A V _{GS} = 10V | - | 21 | - | nC |
| Gate - Source charge | Q _{gs} | | - | 3.8 | - | |
| Gate - Drain charge | Q _{gd} | | - | 4.2 | - | |
| Turn-ON Delay time | t _{D(on)} | V _{GS} = 10V, V _{DS} = 15V R _G = 3.3Ω, I _D = 20A | | 6 | | ns |
| Turn-ON Rise time | t _r | | | 2.0 | | ns |
| Turn-Off Delay time | t _{D(off)} | | | 34 | | ns |
| Turn-Off Fall time | t _f | | | 5.5 | | ns |

Diode Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|-------------------------|----------|---------------------------------------------------|------|-----|------|------|
| Source-drain voltage | V_{SD} | $I_S=14A$ | | | 1.28 | V |
| Reverse Recovery Time | t_{RR} | $V_{DD} = 20 V, dI_S/dt = 100 A/\mu s, I_S = 30A$ | | 8 | | ns |
| Reverse Recovery Charge | Q_{RR} | | | 17 | | ns |

Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Fig.1 Power Dissipation

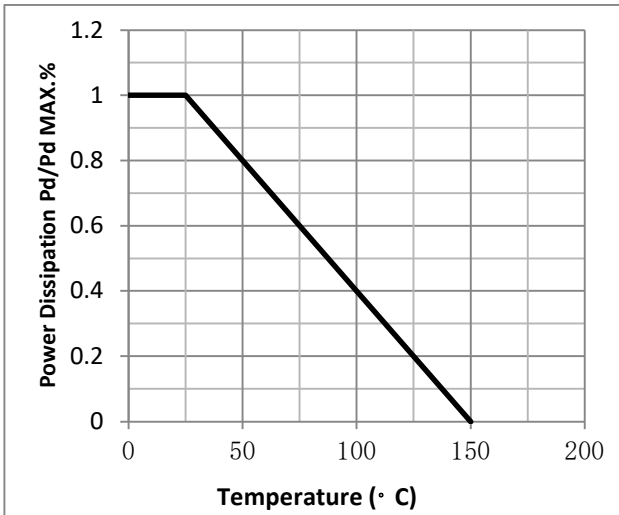


Fig.2 Typical output Characteristics

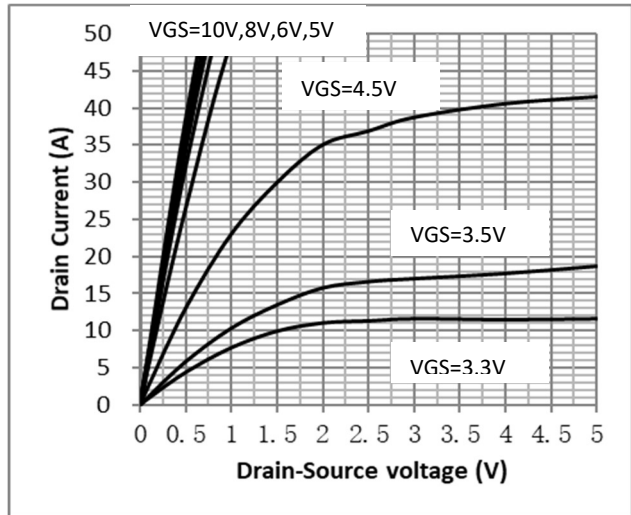


Fig.3 Threshold Voltage $V_{gs(th)}$ V.S Junction Temperature

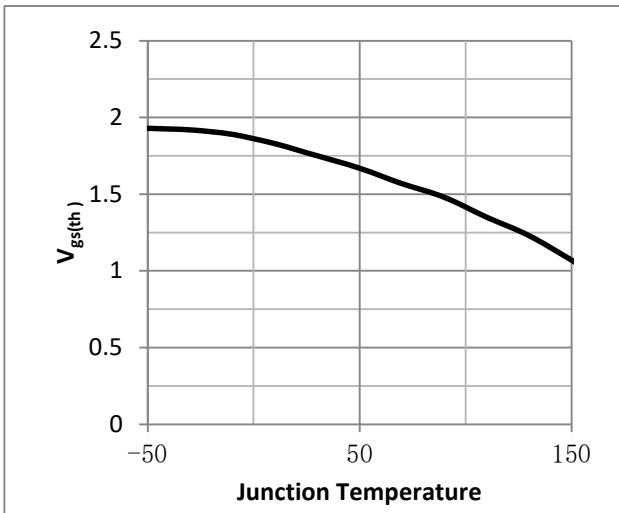


Fig.4 Resistance V.S Drain Current

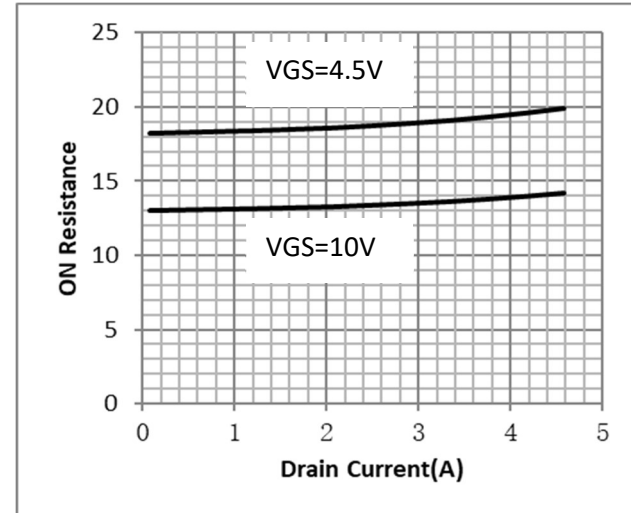


Fig.5 On-Resistance VS Gate Source Voltage

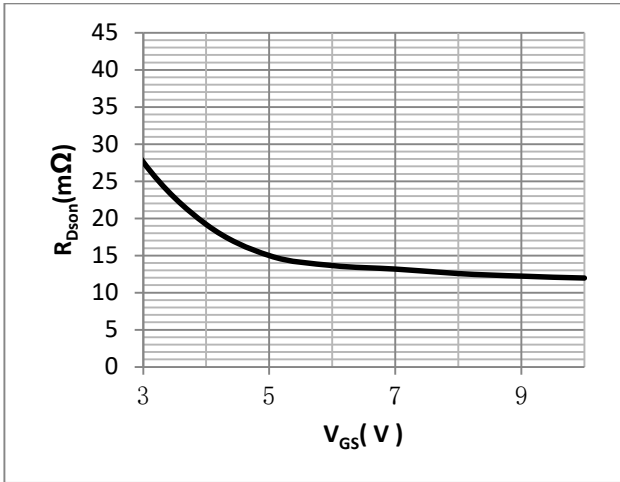


Fig.6 On-Resistance V.S Junction Temperature

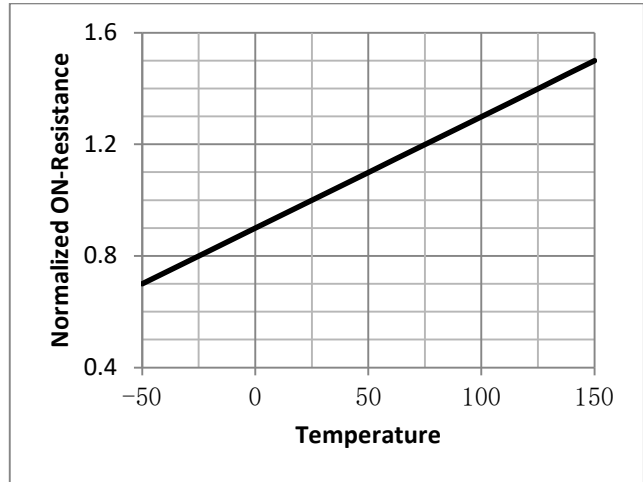


Figure 7. Diode Forward Voltage vs. Current

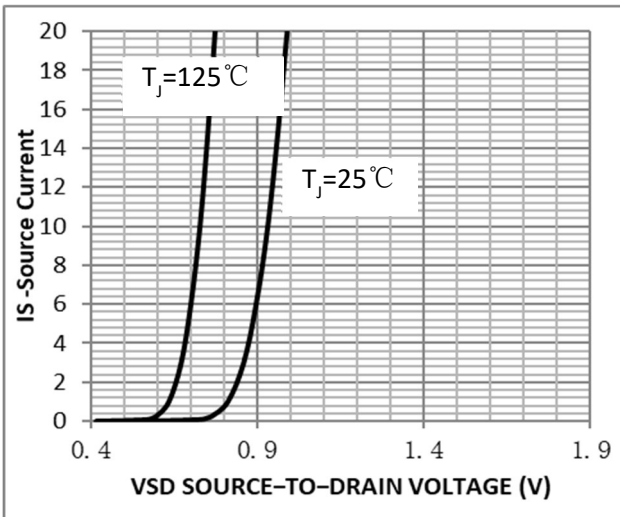


Figure 8. Transfer Characteristics

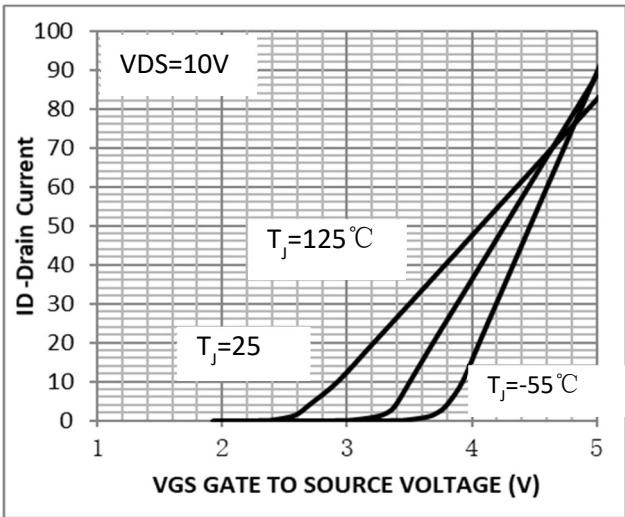


Fig.9 SOA Maximum Safe Operating Area

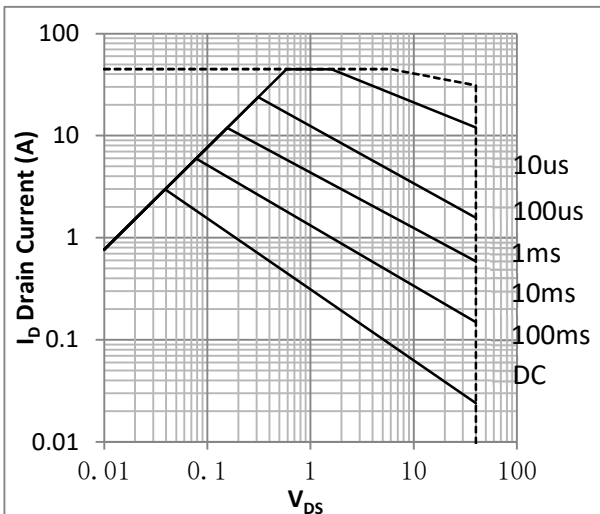


Fig.10 ID-Junction Temperature

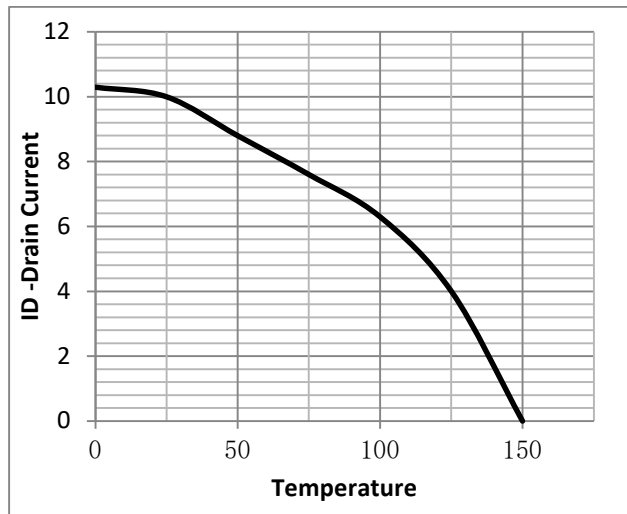


Figure 11. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

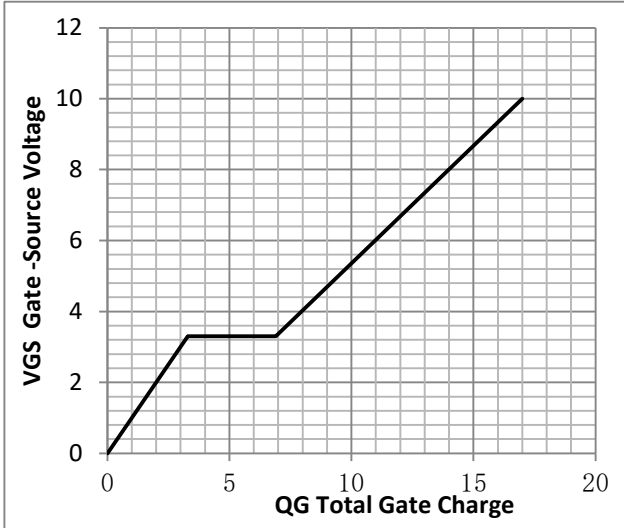


Fig.12 Capacitance Variation

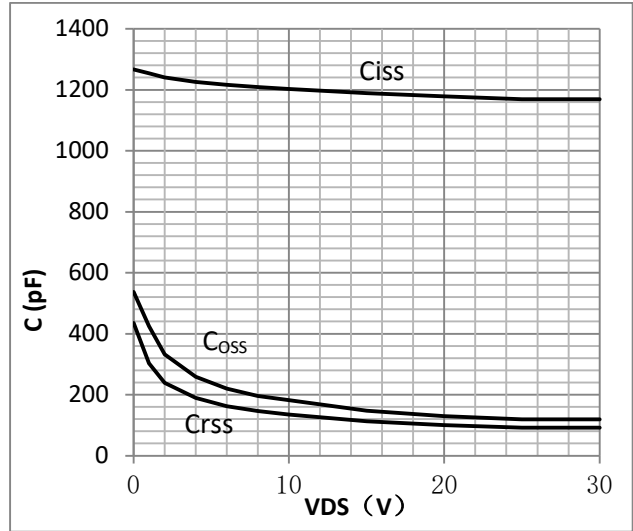


Fig.13 Gate Charge Measurement Circuit

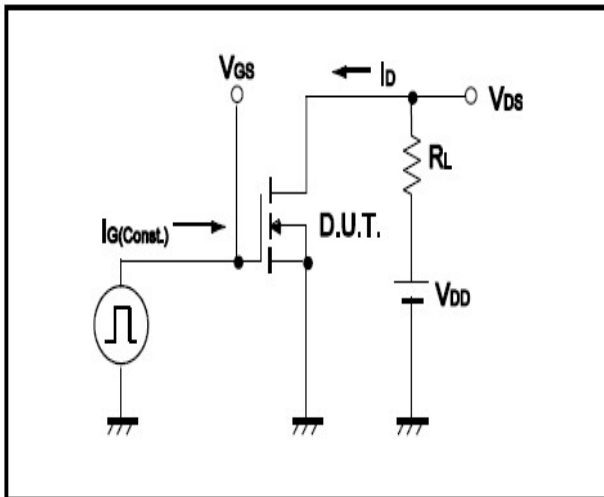


Fig.14 Gate Charge Waveform

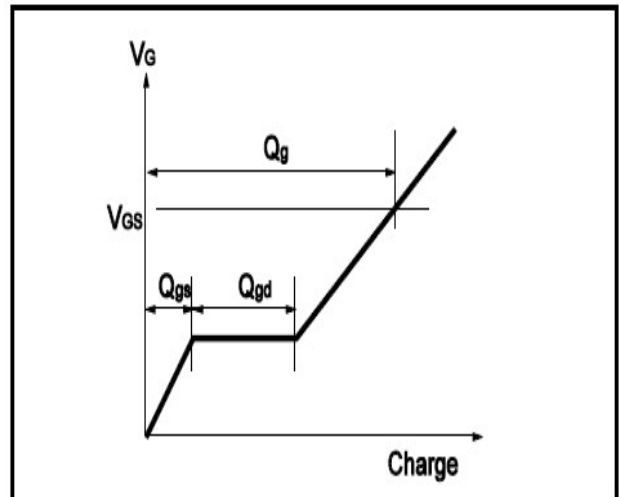


Fig.15 Switching Time Measurement Circuit

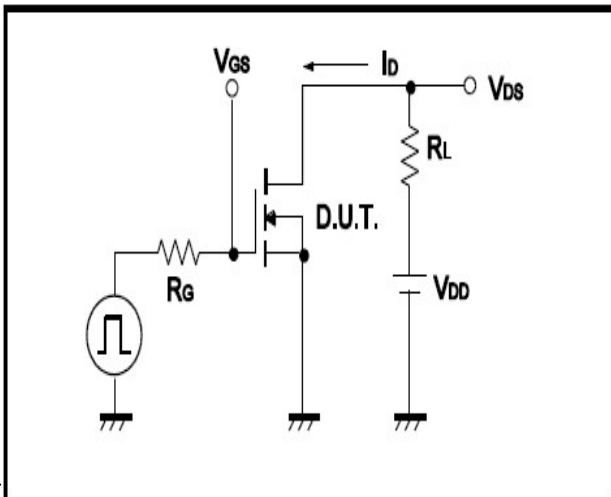


Fig.16 Switching Time Waveform

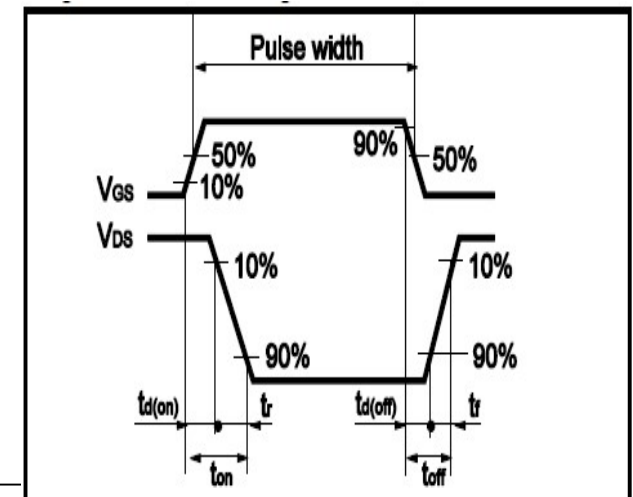




Fig.17 Avalanche Measurement Circuit

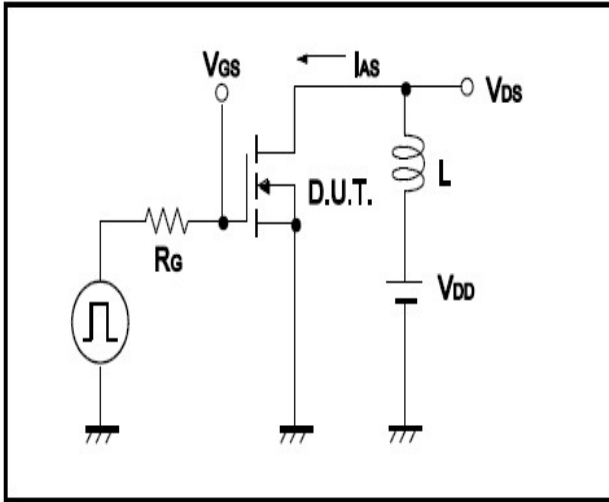
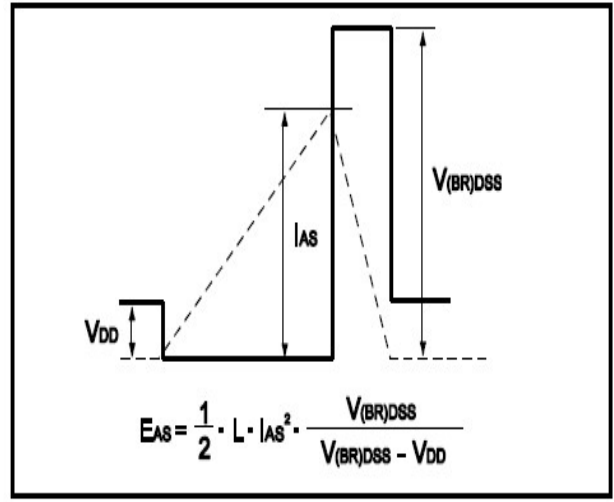
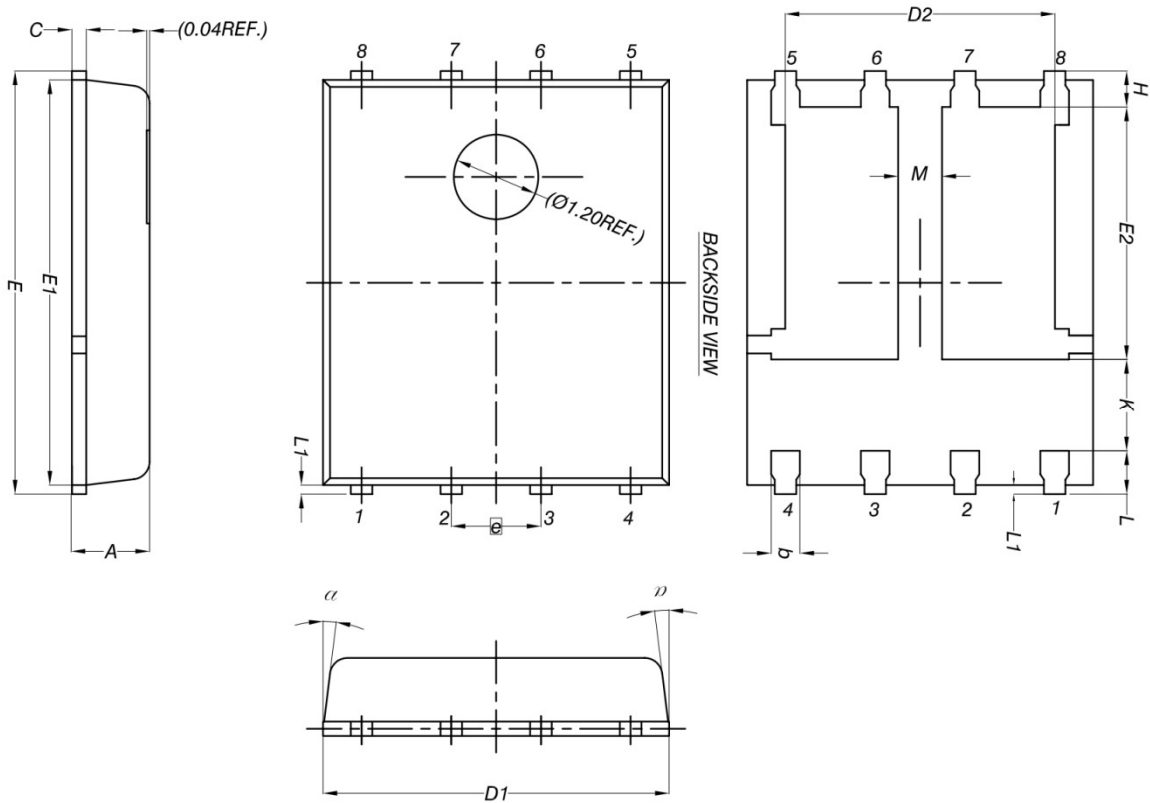


Fig.18 Avalanche Waveform





•Dimensions (DFN5×6)



| DIM. | MILLIMETERS | | |
|------|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| b | 0.33 | 0.41 | 0.51 |
| C | 0.20 | 0.25 | 0.30 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 3.61 | 3.81 | 3.96 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 5.70 | 5.75 | 5.80 |
| E2 | 3.38 | 3.58 | 3.78 |
| e | 1.27 BSC | | |
| H | 0.41 | 0.51 | 0.61 |
| K | 1.10 | - | - |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.06 | 0.13 | 0.20 |
| M | 0.50 | - | - |
| α | 0° | - | 12° |

