

General Description

The ZMD68404N 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

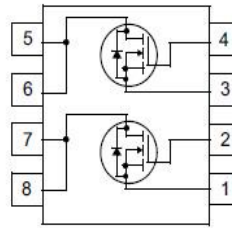
- Power Management in Notebook Computer,
- Portable Equipment and Battery Powered Systems
- BLDC driver

Ordering Information:

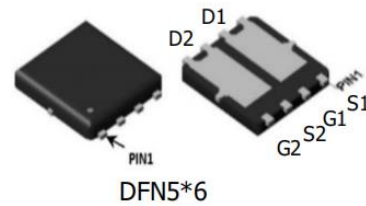
| | |
|---------------------------|-----------|
| Part NO. | ZMD68404N |
| Marking | ZMD68404 |
| Packing Information | REEL TAPE |
| Basic ordering unit (pcs) | 3000 |

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$)

| Parameter | Symbol | Rating | Unit |
|-----------------------------------|---------------------------------|------------|------------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current | $I_D @ T_C = 25^\circ\text{C}$ | 47 | A |
| | $I_D @ T_C = 75^\circ\text{C}$ | 35 | A |
| | $I_D @ T_C = 100^\circ\text{C}$ | 30 | A |
| Pulsed Drain Current ^① | I_{DM} | 141 | A |
| Total Power Dissipation | $P_D @ T_C = 25^\circ\text{C}$ | 85 | W |
| Total Power Dissipation | $P_D @ T_A = 25^\circ\text{C}$ | 3.4 | W |
| Operating Junction Temperature | T_J | -55 to 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Single Pulse Avalanche Energy | E_{AS} | 120 | mJ |
| Avalanche Current | $I_{AS} I_{AR}$ | 25 | A |

Product Summary


$V_{DS1} = 40\text{V}$
 $V_{DS2} = 40\text{V}$
 $R_{DS(ON)1} = 6\text{m}\Omega$
 $R_{DS(ON)2} = 6\text{m}\Omega$
 $I_{D1} = 47\text{A}$
 $I_{D2} = 47\text{A}$





| | | | |
|-----------------|--|---------|--|
| ESD Level (HBM) | | Class 2 | |
|-----------------|--|---------|--|

•Thermal resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|--|------------|------|------|------|---------------|
| Thermal resistance, junction - case | R_{thJC} | - | - | 1.5 | $^{\circ}C/W$ |
| Thermal resistance, junction - ambient | R_{thJA} | - | - | 37 | $^{\circ}C/W$ |
| Soldering temperature, wavesoldering for 10s | T_{sold} | - | - | 265 | $^{\circ}C$ |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|-----------------------------------|--------------|-------------------------------|------|-----|-----------|-----------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 40 | | | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.3 | | 2.5 | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=40V, V_{GS}=0V$ | | | 1.0 | μA |
| Gate- Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=18A$ | | 6 | 9 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=16A$ | | 8 | 12 | $m\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS}=25V, I_D=10A$ | | 9 | | s |
| Source-drain voltage | V_{SD} | $I_S=18A$ | | | 1.28 | V |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|------------------------------|-----------|----------------------------|------|------|------|----------|
| Gate Resistance | R_g | $f = 1MHz$ | | 1.6 | | Ω |
| Input capacitance | C_{iss} | $f = 1MHz$ $V_{DS}=20V$ | - | 3300 | - | pF |
| Output capacitance | C_{oss} | | - | 232 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 171 | - | |

•Gate Charge characteristics($T_a = 25^{\circ}C$)

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|----------------------|----------|----------------|------|-----|------|------|
| Total gate charge | Q_g | $V_{DD} = 25V$ | - | 51 | - | nC |
| Gate - Source charge | Q_{gs} | $I_D = 5A$ | - | 9 | - | |
| Gate - Drain charge | Q_{gd} | $V_{GS} = 10V$ | - | 9.6 | - | |

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

Fig.1 Power Dissipation

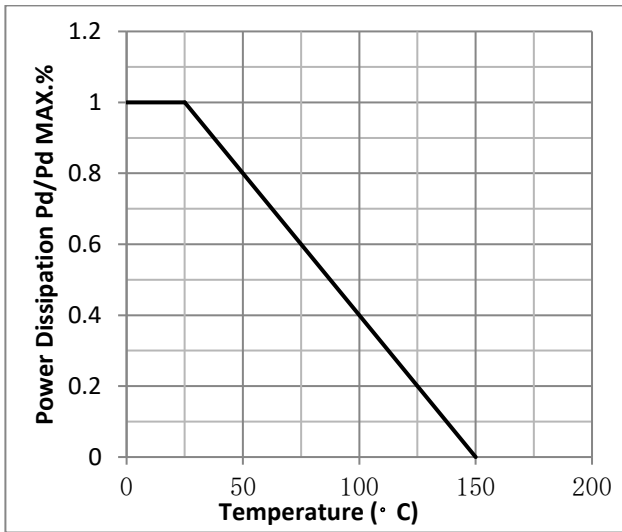


Fig.2 Typical output Characteristics

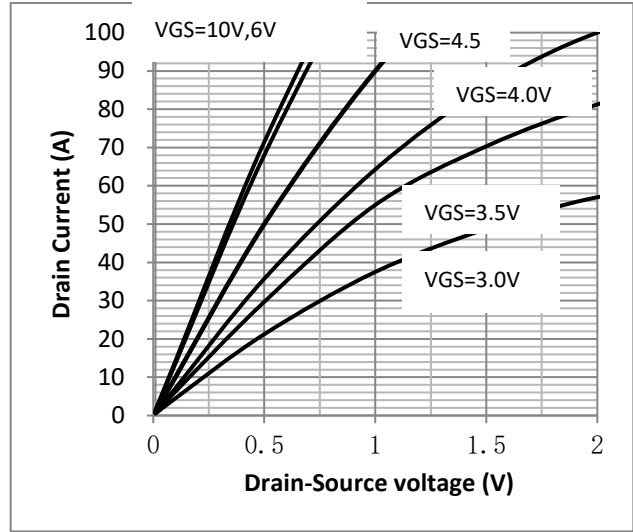


Fig.3 Threshold Voltage V.S Junction Temperature

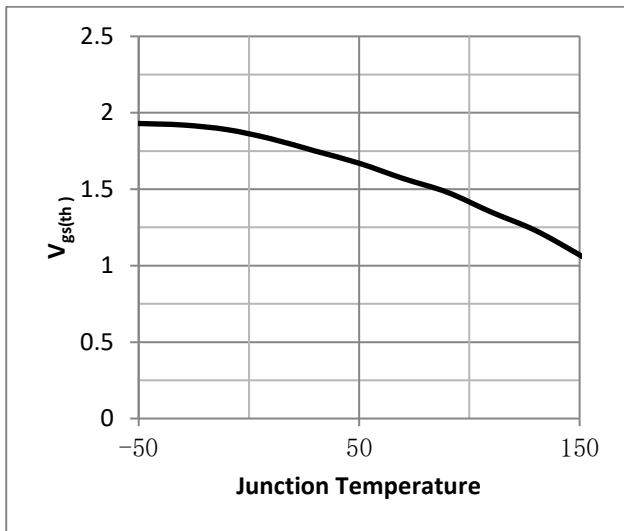


Fig.4 Resistance V.S Drain Current

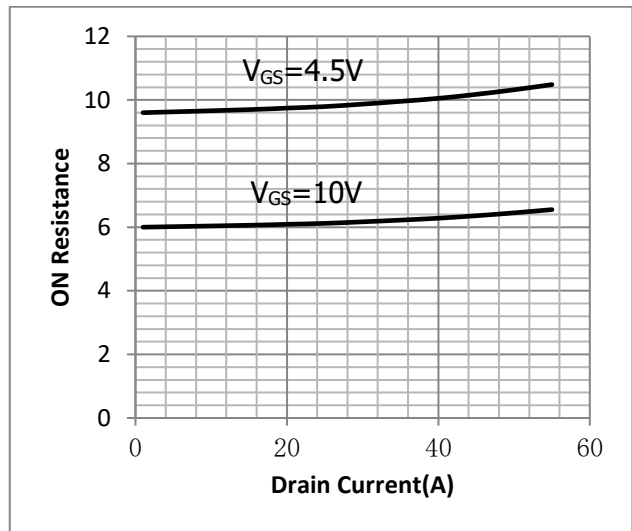


Fig.5 On-Resistance VS Gate Source Voltage

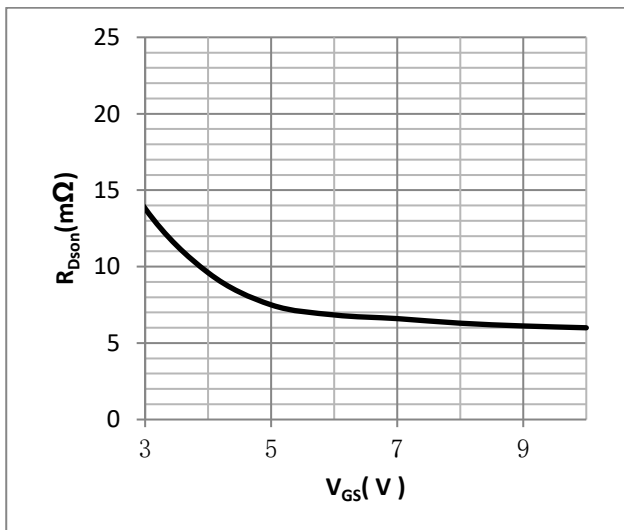


Fig.6 On-Resistance V.S Junction Temperature

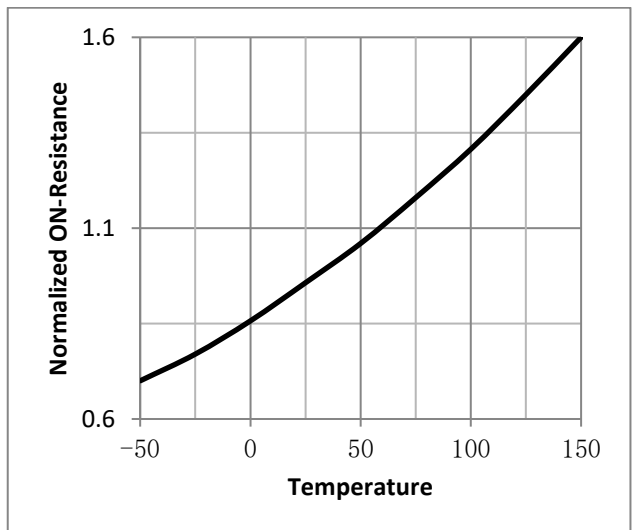


Fig.7 Gate Charge Characteristics

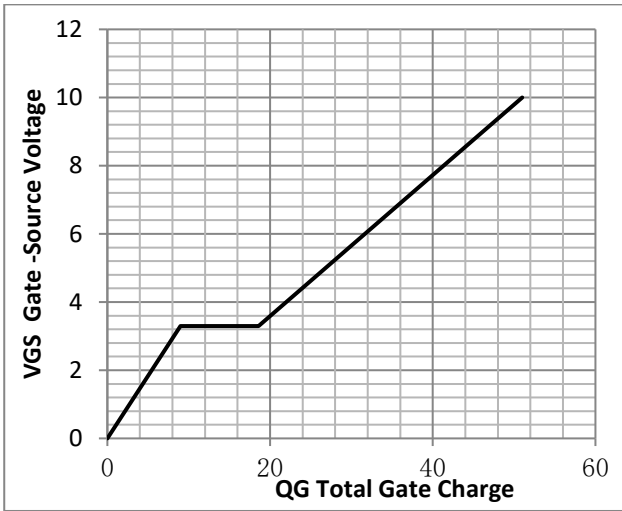


Fig.8 Capacitance vs Vds

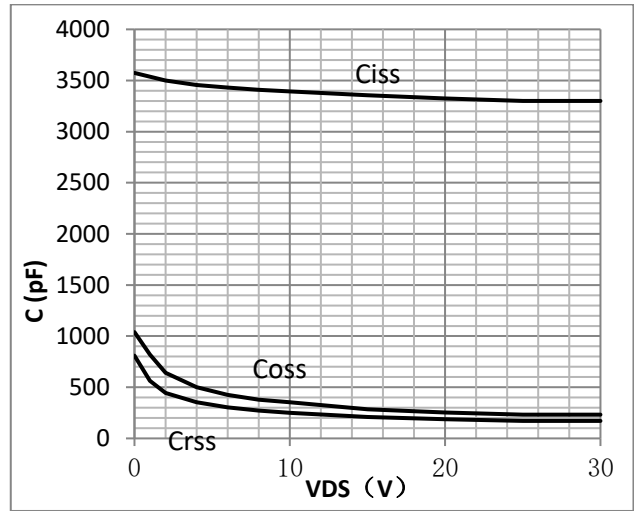


Fig.9 SOA Maximum Safe Operating Area

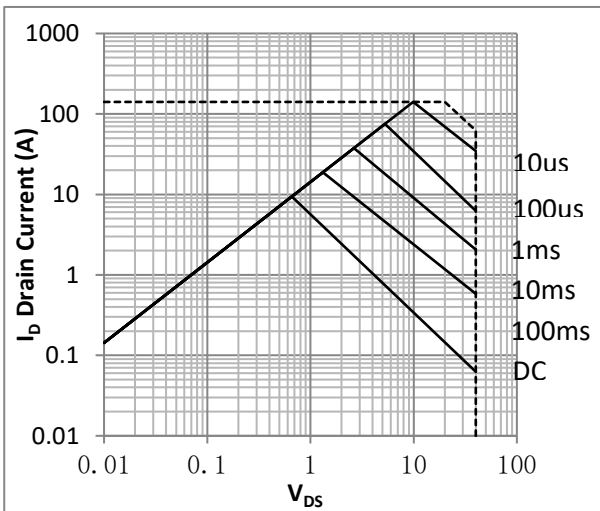


Fig.10 ID-Junction Temperature

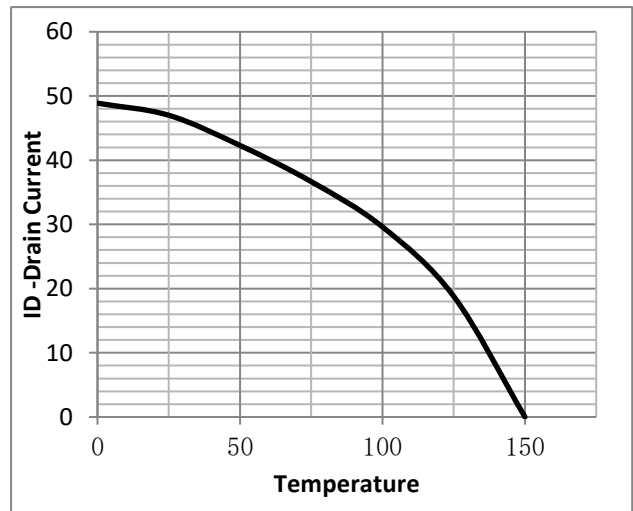


Fig.11 Transfer Characteristics

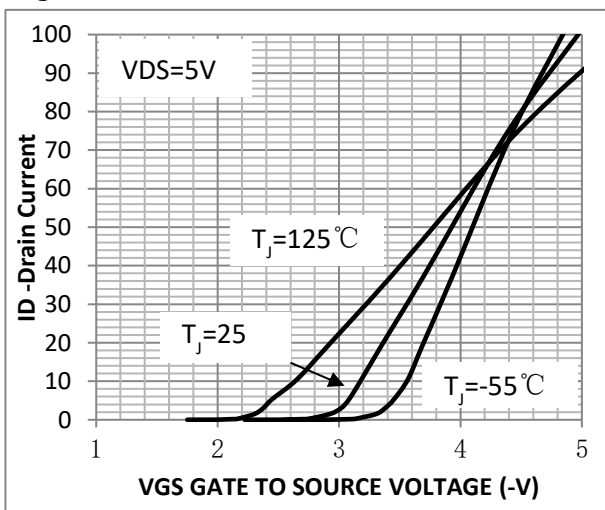


Fig.12 Switching Time Measurement Circuit

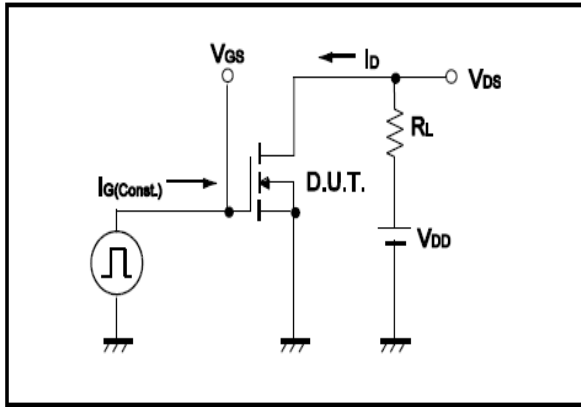


Fig.13 Gate Charge Waveform

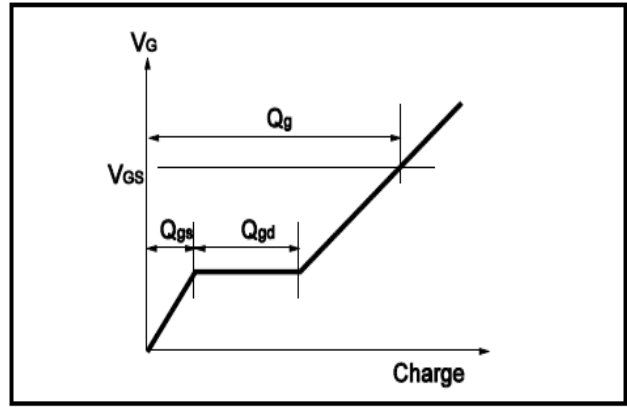


Fig.14 Switching Time Measurement Circuit

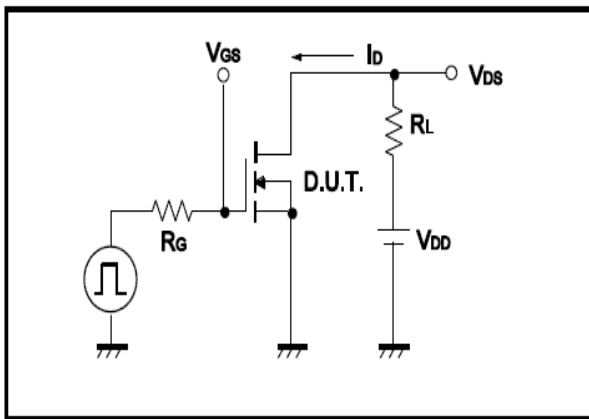


Fig.15 Gate Charge Waveform

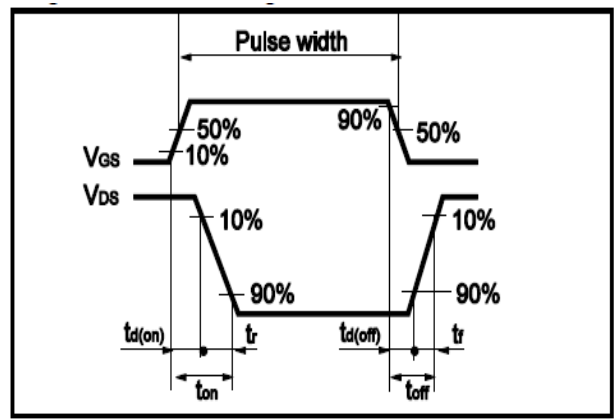


Fig.16 Avalanche Measurement Circuit

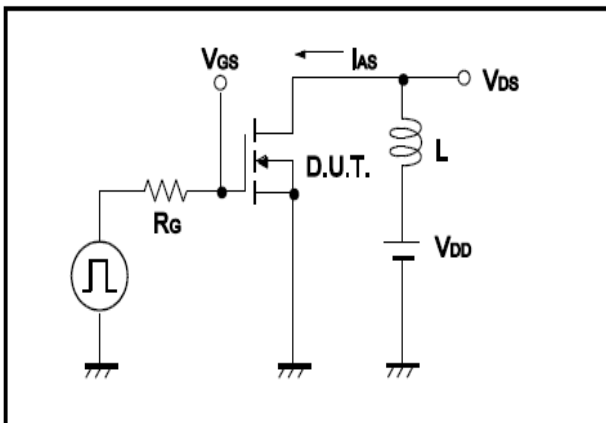
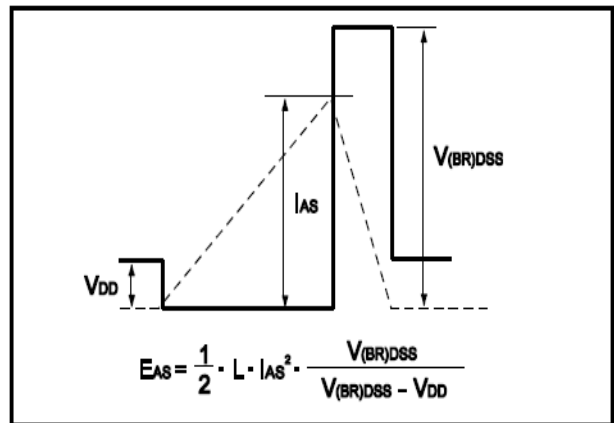
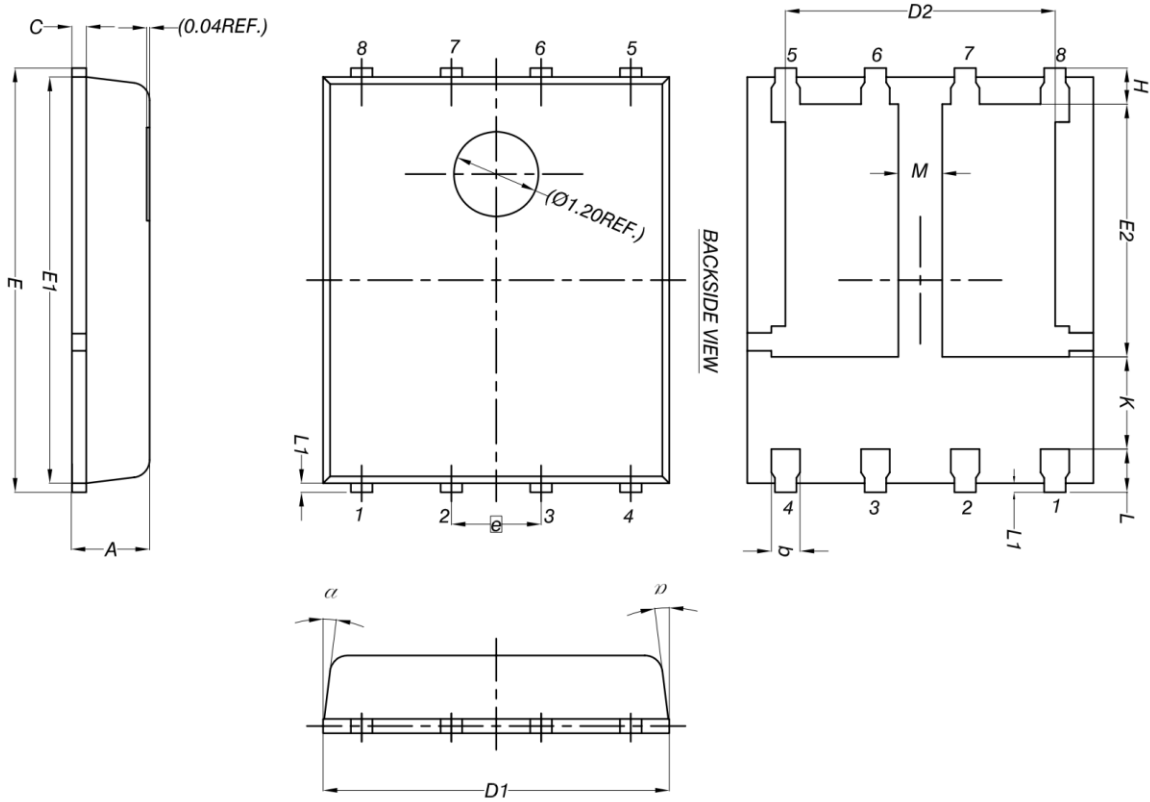


Fig.17 Avalanche Waveform





•Dimensions (DFN5x6)



| 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° |

