

30V N-Channel Power Trench MOSFET

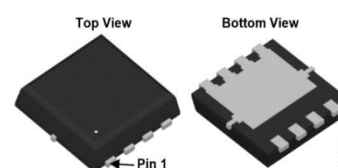
DESCRIPTION :

- Excellent $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested
- 100% ΔV_{ds} Tested
- Pb-Free Lead Plating
- RoHS compliant
- Halogen Free

| | |
|--------------------------------|---------------|
| V_{DSS} | 30V |
| $I_D @ V_{GS}=10V$ | 52A |
| $R_{DS(ON_Typ. @ V_{GS}=10V}$ | 4.3m Ω |

TYPICAL APPLICATIONS :

- Load Switch
- PWM Application
- Power Management



PDFN3x3-8L

MAXIMUM RATINGS (at $T_c = 25^\circ C$, unless otherwise specified)

| Characteristic | Condition | Symbol | Value | Unit |
|---|---------------------------------------|----------------|----------------|------------|
| Drain-Source Voltage | | V_{DS} | 30 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | V |
| Continuous Drain Current | $T_c=25^\circ C$ $T_c=100^\circ C$ | I_D | 52 33 | A |
| Pulsed Drain Current ⁽¹⁾ | | I_{DM} | Refer to Fig.4 | A |
| Single Pulsed Avalanche Energy ⁽²⁾ | | EAS | 54 | mJ |
| Power dissipation | $T_c=25^\circ C$ $T_c=100^\circ C$ | P_D | 26 10 | W |
| Junction & Storage temperature Range | | T_J, T_{STG} | -55~+150 | $^\circ C$ |

Notes : 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. EAS condition: Starting $T_J=25^\circ C$, $V_{DD}=50V$, $V_{GS}=10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=14.7A$, $V_{DD}=0V$ during time in avalanche.

THERMAL CHARACTERISTICS

| Characteristic | Condition | Symbol | Value | Unit |
|---------------------|---|------------------------------------|-----------|--------------|
| Thermal resistance, | Junction to Ambient Junction to Case | $R_{\theta JA}$ $R_{\theta JC}$ | 52 4.8 | $^\circ C/W$ |

ELECTRICAL CHARACTERISTICS (at $T_J = 25\text{ }^\circ\text{C}$, unless otherwise specified)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---------------|------|------------|------------|------------|
| Drain-Source Breakdown Voltage $V_{GS} = 0V, I_D = 250\mu A$ | $V_{(BR)DSS}$ | 30 | | | V |
| Zero Gate Voltage Drain Current $V_{DS} = 30V, V_{GS} = 0V,$ | I_{DSS} | | | 1.0 | μA |
| Gate-Source Leakage Current $V_{GS} = \pm 20V, V_{DS} = 0V$ | I_{GSS} | | | ± 100 | nA |
| Gate-Source threshold voltage $V_{DS} = V_{GS}, I_D = 250\mu A$ | $V_{GS(th)}$ | 1.2 | 1.7 | 2.2 | V |
| Drain-Source On-State Resistance $V_{GS} = 10V, I_D = 30A$ $V_{GS} = 4.5V, I_D = 20A$ | $R_{DS(on)}$ | | 4.3 6.1 | 5.6 7.9 | m Ω |
| Gate Resistance $f=1MHz$ | R_g | | 2.7 | | Ω |
| Input capacitance $f=1MHz, V_{DS}=15V, V_{GS}=0V$ | C_{iss} | | 1612 | 2177 | pF |
| Output capacitance $f=1MHz, V_{DS}=15V, V_{GS}=0V$ | C_{oss} | | 192 | 259 | pF |
| Reverse transfer capacitance $f=1MHz, V_{DS}=15V, V_{GS}=0V$ | C_{rss} | | 164 | 222 | pF |
| Total Gate Charge $V_{DS}= 15V, I_D= 30A, V_{GS}=0$ to 10V | Q_G | 24 | 33 | 45 | nC |
| Gate to Source Charge $V_{DS}= 15V, I_D= 30A, V_{GS}=0$ to 10V | Q_{GS} | | 6 | | nC |
| Gate to Drain Charge $V_{DS}= 15V, I_D= 30A, V_{GS}=0$ to 10V | Q_{GD} | | 7 | | nC |
| Turn-on delay time $V_{DD}= 15V, V_{GS}= 10V, I_D=30A, R_{GEN}=3\Omega$ | $t_d(ON)$ | | 7 | | ns |
| Rise time $V_{DD}= 15V, V_{GS}= 10V, I_D=30A, R_{GEN}=3\Omega$ | t_r | | 15 | | ns |
| Turn-off delay time $V_{DD}= 15V, V_{GS}= 10V, I_D=30A, R_{GEN}=3\Omega$ | $t_d(OFF)$ | | 31 | | ns |
| Fall time $V_{DD}= 15V, V_{GS}= 10V, I_D=30A, R_{GEN}=3\Omega$ | t_f | | 8 | | ns |
| Maximum Continuous Body Diode Forward Current | I_S | | | 52 | A |
| Maximum Pulsed Body Diode Forward Current | I_{SM} | | | 209 | A |
| Body Diode Forward Voltage $V_{GS} = 0V, I_S = 30A$ | V_{SD} | | | 1.2 | V |
| Revers Recovery Time $I_F=20A, di/dt = 100A/\mu s$ | T_{rr} | | 8 | | ns |
| Revers Recovery Charge $I_F=20A, di/dt = 100A/\mu s$ | Q_{rr} | | 1.8 | | nC |

Typical Performance Characteristics

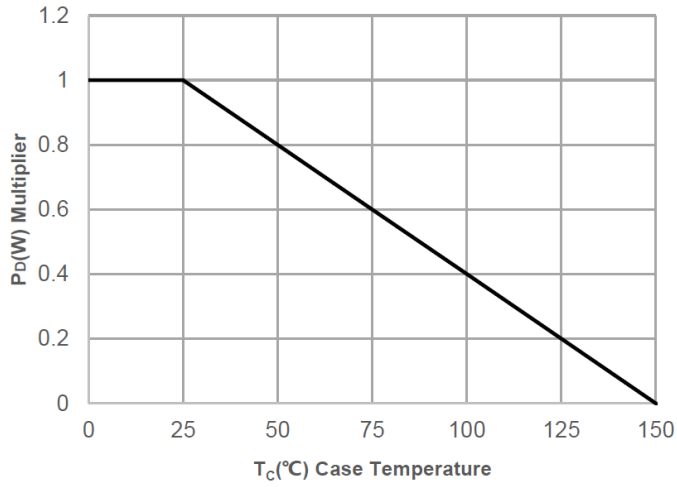


Figure 1. Power De-rating

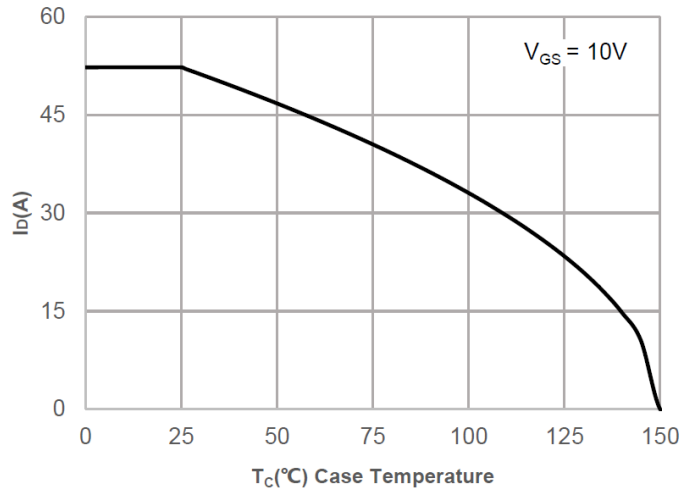


Figure 2. Current De-rating

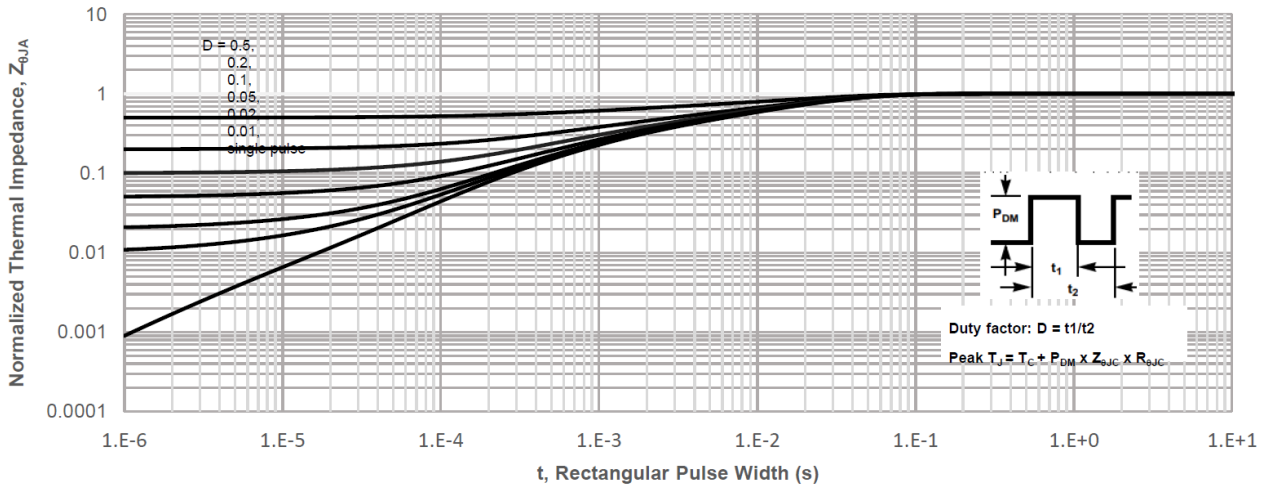


Figure 3. Normalized Maximum Transient Thermal Impedance

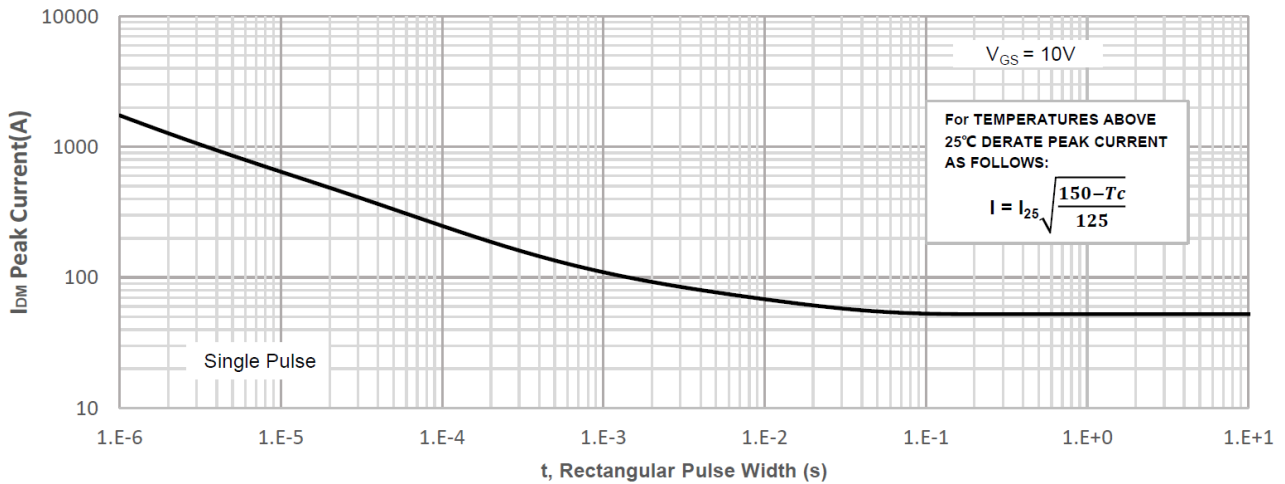


Figure 4. Peak Current Capacity

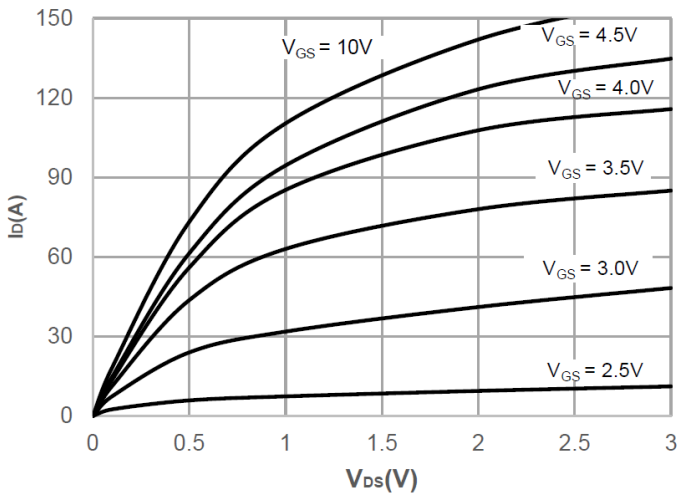


Figure 5. Output Characteristics

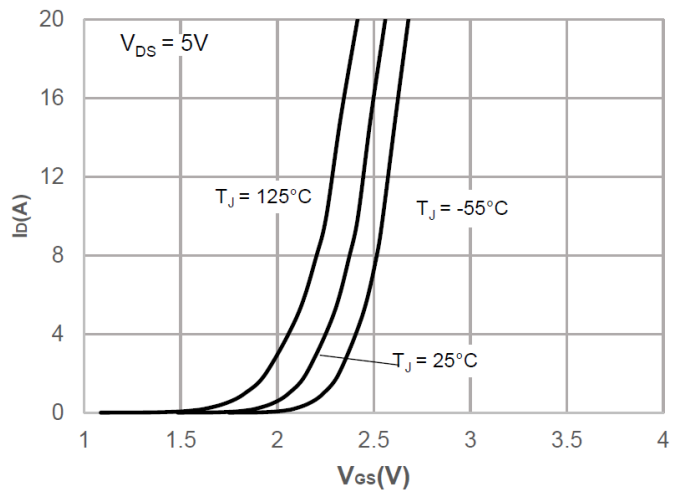


Figure 6. Typical Transfer Characteristics

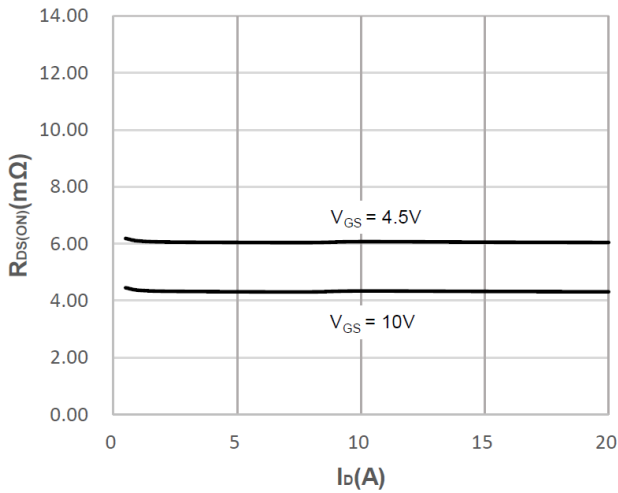


Figure 7. On-resistance vs. Drain Current

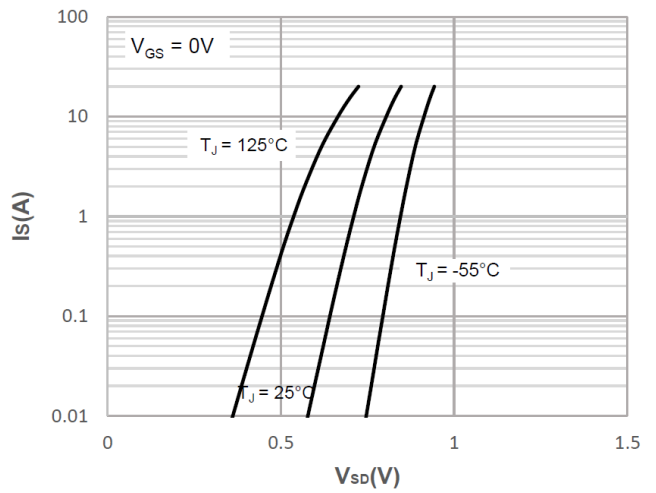


Figure 8. Body Diode Characteristics

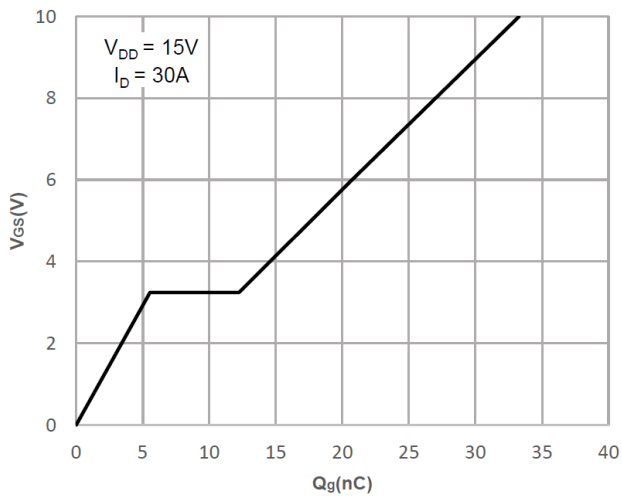


Figure 9. Gate Charge Characteristics

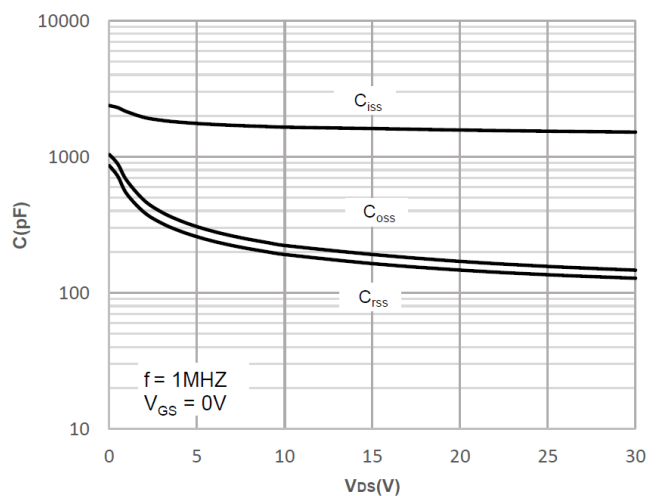


Figure 10. Capacitance Characteristics

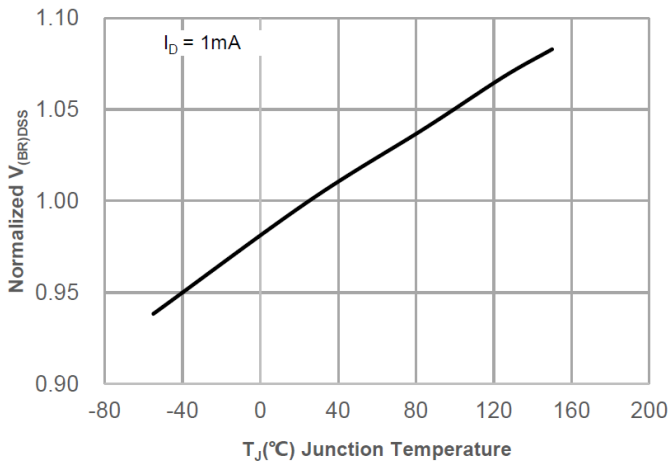


Figure 11. Normalized Breakdown voltage vs. Junction Temperature

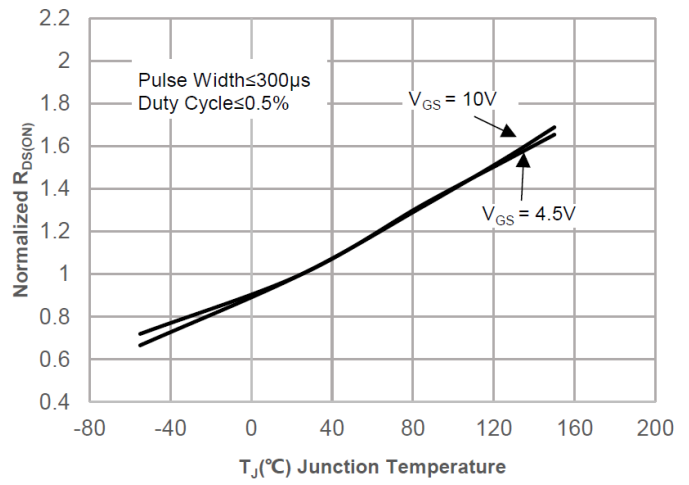


Figure 12. Normalized on Resistance vs. Junction Temperature

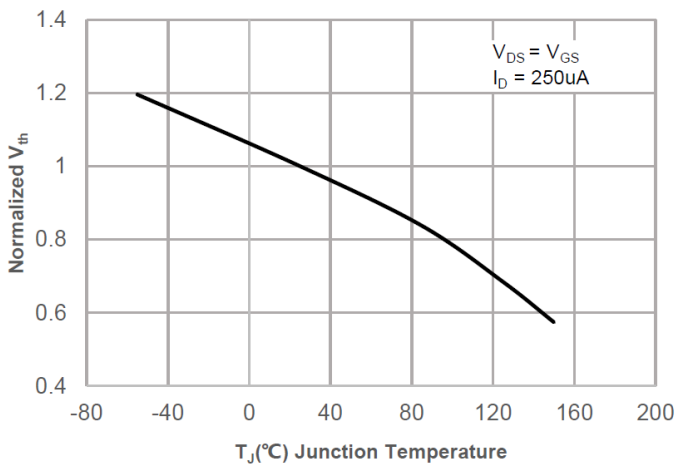


Figure 13. Normalized Threshold Voltage vs. Junction Temperature

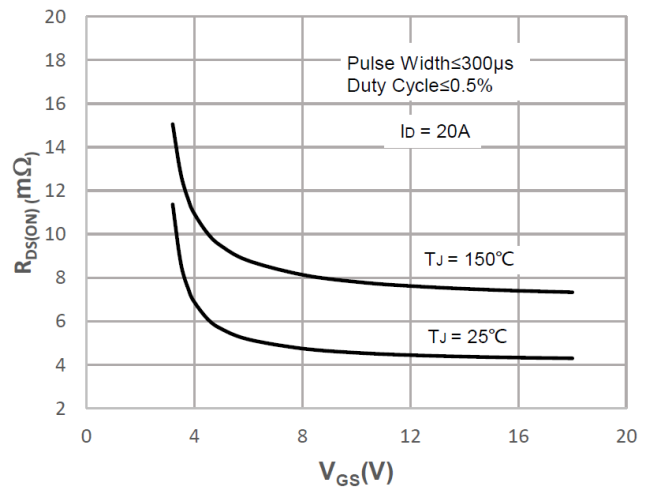


Figure 14. $R_{DS(ON)}$ vs. V_{GS}

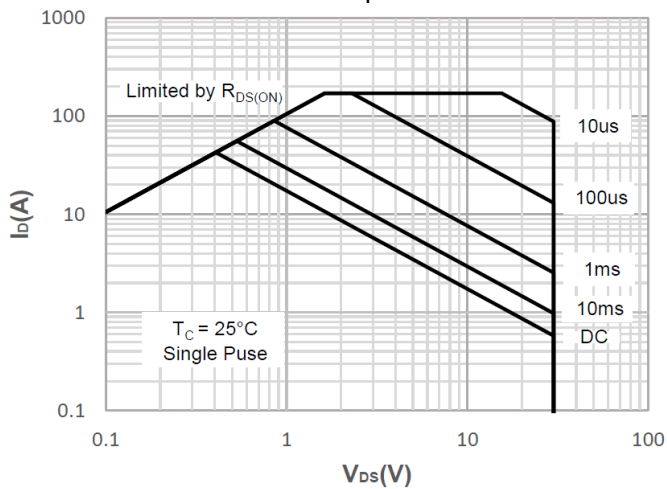
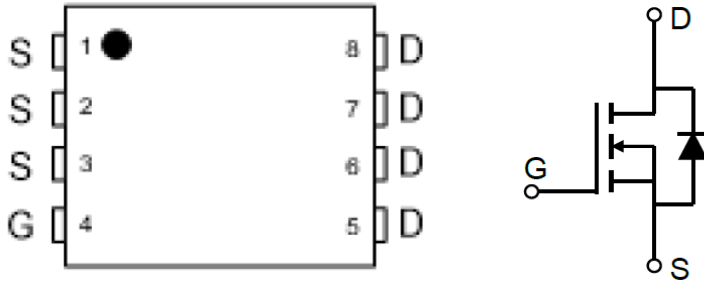
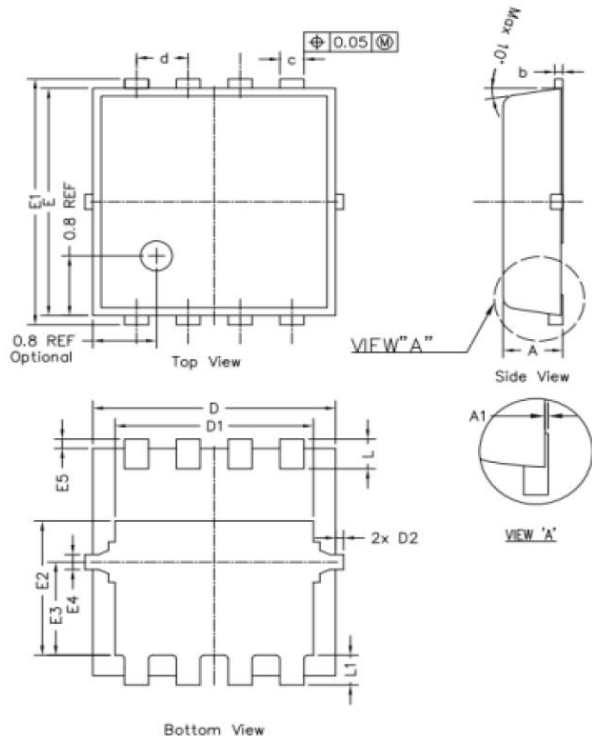


Figure 15. Maximum Safe Operating Area

·Circuit diagram



·Package outlines : Dimensions in (mm)



| SYMBOLS | DIMENSION IN MM | | | DIMENSION IN INCHES | | |
|---------|-----------------|-------|-------|---------------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.750 | 0.800 | 0.028 | 0.030 | 0.031 |
| A1 | --- | --- | 0.050 | ---- | ---- | 0.002 |
| b | 0.144 | 0.152 | 0.202 | 0.006 | 0.006 | 0.008 |
| c | 0.250 | 0.300 | 0.350 | 0.010 | 0.012 | 0.014 |
| d | 0.65 BSC | | | 0.026 BSC | | |
| D | 2.950 | 3.050 | 3.150 | 0.116 | 0.120 | 0.124 |
| D1 | 2.390 | 2.490 | 2.590 | 0.094 | 0.098 | 0.102 |
| D2 | --- | --- | 0.125 | --- | --- | 0.005 |
| E | 2.950 | 3.050 | 3.150 | 0.116 | 0.120 | 0.124 |
| E1 | 3.200 | 3.300 | 3.400 | 0.126 | 0.130 | 0.134 |
| E2 | 1.700 | 1.800 | 1.900 | 0.067 | 0.071 | 0.075 |
| E3 | 1.150 | 1.250 | 1.350 | 0.045 | 0.049 | 0.053 |
| E4 | 0.150 | 0.200 | 0.250 | 0.006 | 0.008 | 0.010 |
| E5 | 0.075 | 0.125 | 0.175 | 0.003 | 0.005 | 0.007 |
| L | 0.300 | 0.400 | 0.500 | 0.01 | 0.02 | 0.02 |
| L1 | 0.300 | 0.400 | 0.500 | 0.01 | 0.02 | 0.02 |

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