

BMD60N600C1

N-Channel Power MOSFET

600 V, 8 A, 600 mΩ



bestirpower

Description

BMD60N600C1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

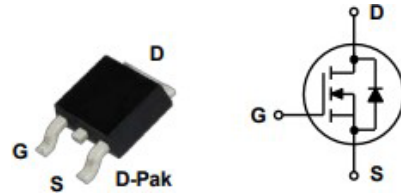
Features

| | | | |
|--------------------|-------|------------------|-------------|
| $V_{DS}@T_{J,max}$ | I_D | $R_{DS(on),max}$ | $Q_{g,typ}$ |
| 650 V | 8 A | 600 mΩ | 15 nC |

- Extremely low losses due to very low FOM $R_{ds(on)}*Q_g$ and E_{oss} .
- Very high commutation ruggedness.

Applications

- ~ PFC
- ~ UPWM
- ~ LCD TV
- ~ Lighting
- ~ UPS



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

| Symbol | Parameter | Value | Unit |
|-----------|---|--|------|
| V_{DSS} | Drain to Source Voltage ¹⁾ | 600 | V |
| V_{GSS} | Gate to Source Voltage | ±30 | V |
| I_D | Drain Current ²⁾ | Continuous ($T_C = 25^\circ\text{C}$) | 8 |
| | | Continuous ($T_C = 125^\circ\text{C}$) | 3.3 |
| I_{DM} | Drain Current | Pulsed | 24 |
| P_D | Power Dissipation | 62.5 | W |
| E_{AS} | Single Pulsed Avalanche Energy ³⁾ | 81 | mJ |
| dv/dt | MOSFET dv/dt ruggedness | 50 | V/ns |
| | Diode Recovery dv/dt ruggedness ⁴⁾ | 15 | |
| T_{STG} | Storage Temperature Range | -55 to 150 | °C |
| T_J | Maximum Operating Junction Temperature | 150 | °C |
| T_L | Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds | 260 | °C |

1) Limited by T_J max. Maximum duty cycle $D=0.75$.

2) Pulse width t_p limited by T_J , max.

3) $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

4) $V_{DClamp}=400\text{V}$; $V_{DS,peak} < V_{(BR)DSS}$; identical low side and high side switch with identical R_G .

Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|-----------------|---|-------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, max $T_C = 25^\circ\text{C}$ | 2 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, max $T_C = 25^\circ\text{C}$ | 62 | |

Package Marking and Ordering Information

| Part Number | Top Marking | Package | Packing Method | Reel Size | Tape Width | Quantity |
|-------------|-------------|---------|----------------|-----------|------------|------------|
| BMD60N600C1 | BMD60N600C1 | D-Pak | Tape & Reel | 330 mm | 16 mm | 2500 units |

Electrical Characteristics (T_C = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|----------------------------|-----------------------------------|--|-----|-----|------|------|
| Off Characteristics | | | | | | |
| BV _{DSS} | Drain to Source Breakdown Voltage | V _{GS} = 0 V, I _D = 250μA | 600 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 600 V, V _{GS} = 0 V T _J =25°C | - | - | 1 | μA |
| | | V _{DS} = 600 V, V _{GS} = 0 V T _J =150°C | - | - | 10 | μA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} = ±20 V, V _{DS} = 0 V | - | - | ±100 | nA |

On Characteristics

| | | | | | | |
|---------------------|--------------------------------------|--|---|-----|-----|----|
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} = V _{DS} , I _D = 250μA | 2 | 3 | 4 | V |
| R _{DS(on)} | Static Drain to Source On Resistance | V _{GS} = 10 V, I _D = 3.5A T _J =25°C | - | 500 | 600 | mΩ |

Dynamic Characteristics

| | | | | | | |
|----------------------|---|---|---|-----|---|----|
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =50V, f = 1MHz | - | 370 | - | pF |
| C _{oss} | Output Capacitance | | - | 23 | - | pF |
| C _{rss} | Reverse Transfer Capacitance | | - | 1.3 | - | pF |
| C _{o(er)} | Energy Related Output Capacitance ¹⁾ | V _{DS} = 0V to 400V, V _{GS} = 0V | - | 16 | - | pF |
| C _{o(tr)} | Time Related Output Capacitance ²⁾ | V _{DS} = 0V to 400V, V _{GS} = 0V | - | 87 | - | pF |
| Q _g | Total Gate Charge | V _{GS} = 0-10V, V _{DD} = 480V, I _D = 4A | - | 15 | - | nC |
| Q _{gs} | Gate to Source Charge | | - | 2.4 | - | nC |
| Q _{gd} | Gate to Drain "Miller" Charge | | - | 9 | - | nC |
| V _{plateau} | Gate plateau voltage | | - | 6 | - | V |
| R _G | Gate Resistance | V _{GS} = 0V, f = 1MHz | - | 3.6 | - | Ω |

Switching Characteristics

| | | | | | | |
|---------------------|---------------------|---|---|----|---|----|
| t _{d(on)} | Turn-On Delay Time | V _{GS} = 10V, V _{DD} = 400V, I _D =4A | - | 18 | - | ns |
| t _r | Turn-On Rise Time | | - | 12 | - | ns |
| t _{d(off)} | Turn-Off Delay Time | | - | 50 | - | ns |
| t _f | Turn-Off Fall Time | | - | 16 | - | ns |

Reverse Diode Characteristics

| | | | | | | |
|------------------|----------------------------------|---|---|------|---|----|
| I _{SD} | Continuous Diode Forward Current | T _C =25°C | - | - | 8 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} = 0V, I _F = 4A, T _F = 25°C | - | 0.86 | - | V |
| t _{rr} | Reverse Recovery Time | V _R =400V, I _F =4A di _F /dt = 100A/μs | - | 200 | - | ns |
| Q _{rr} | Reverse Recovery Charge | | - | 1.25 | - | μC |
| I _{rrm} | Reverse Recovery Current | | - | 14 | - | A |

1) C_{o(er)} is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V.

2) C_{o(tr)} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V.

Typical Performance Characteristics

Figure 1. Power dissipation

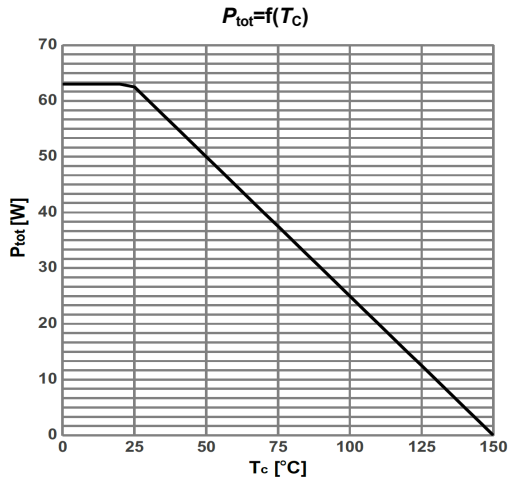


Figure 2. Max. transient thermal impedance

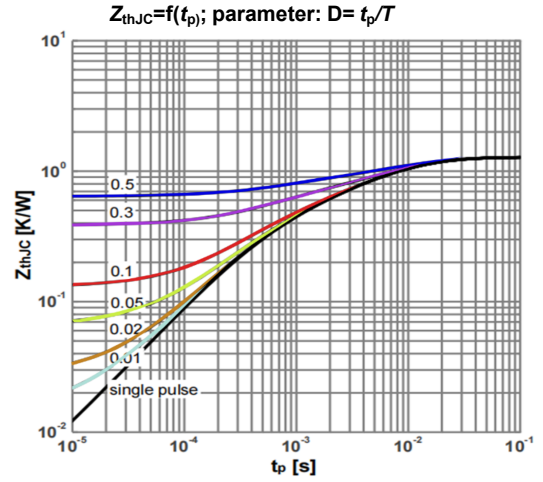


Figure 3: Safe operating area

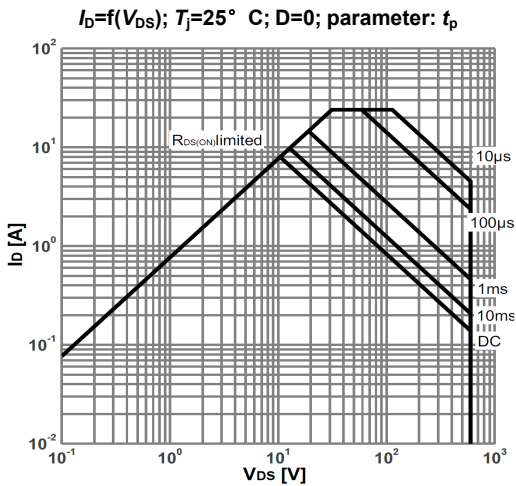


Figure 4: Typ. output characteristics

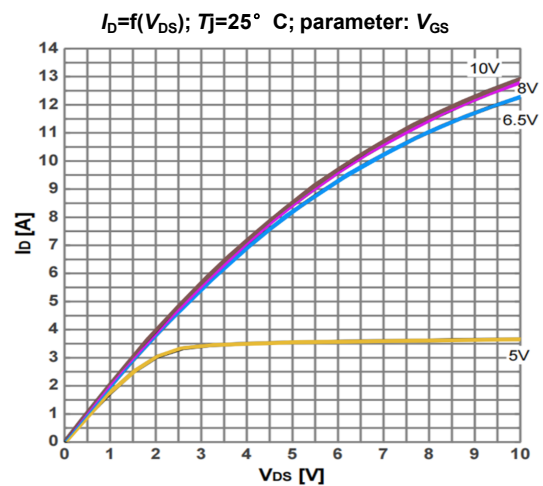


Figure 5: Typ. output characteristics

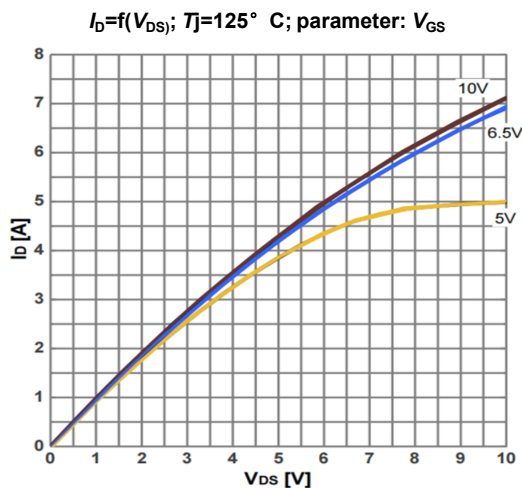
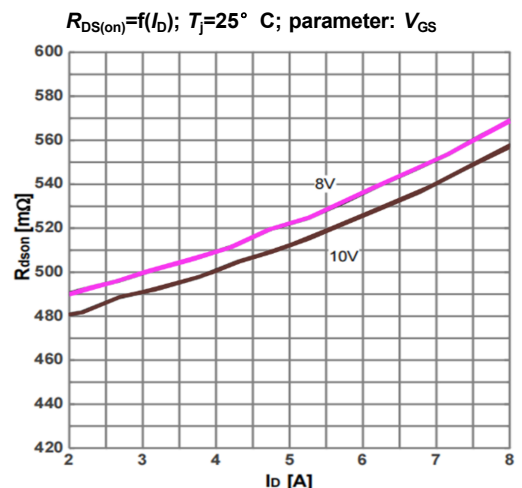


Figure 6: Typ. drain-source on-state resistance



Typical Performance Characteristics

Figure 7: drain-source on-state resistance

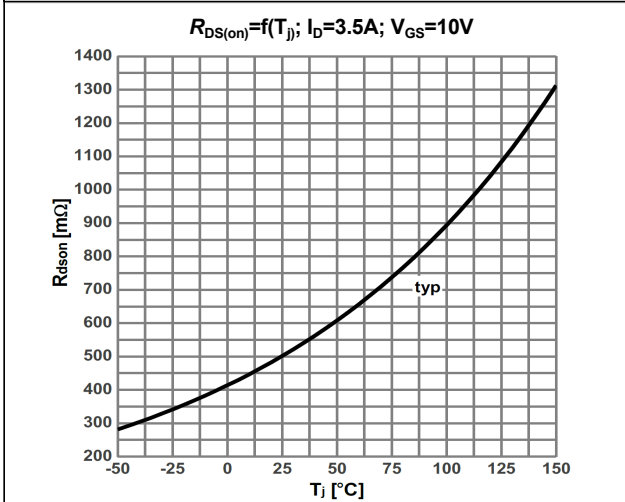


Figure 8: Typ. transfer characteristics

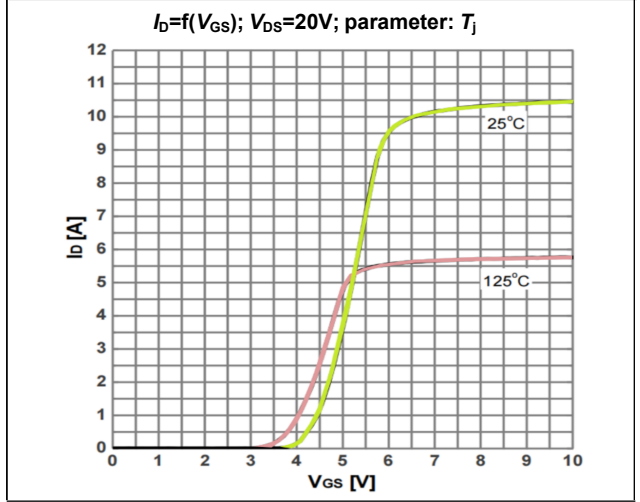


Figure 9:Typ. gate charge

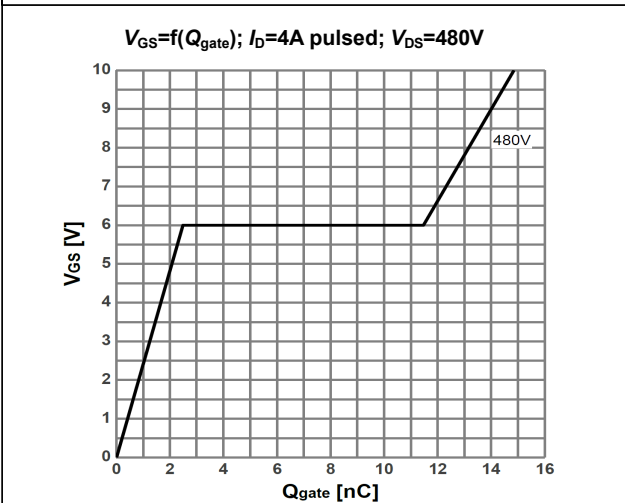


Figure 10:Forward characteristics of reverse diode

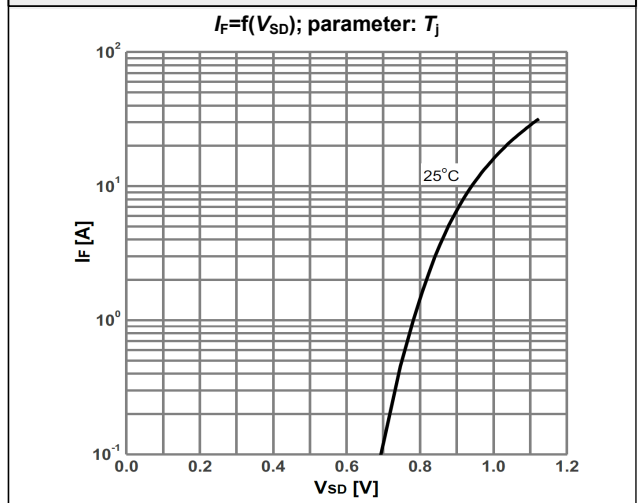


Figure 11:Drain-source breakdown voltage

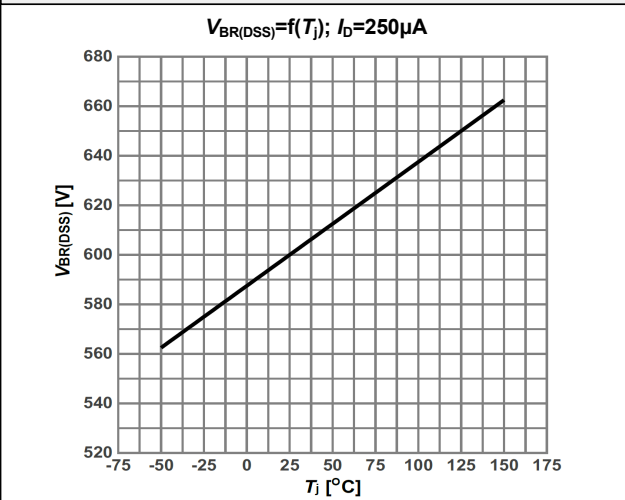
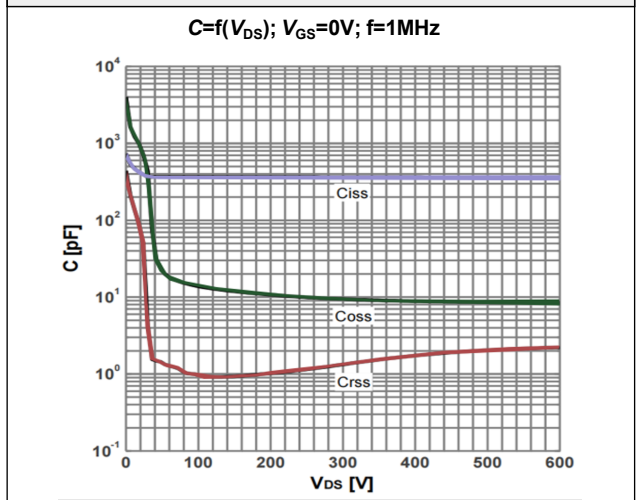
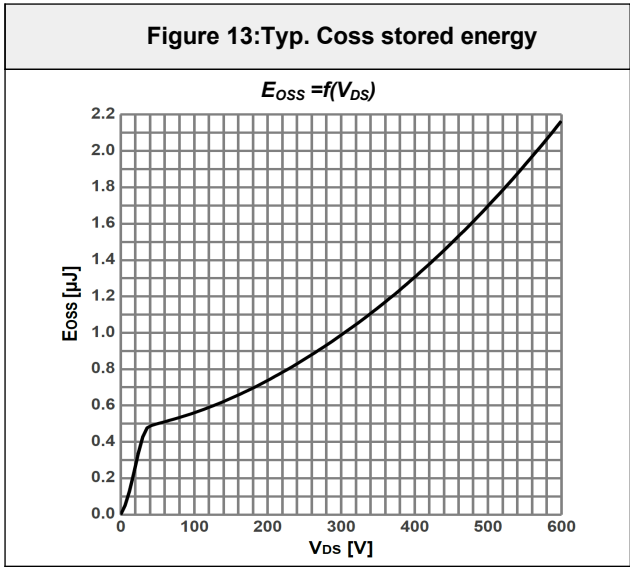


Figure 12:Typ. capacitances



Typical Performance Characteristics

Figure 13: Typ. Coss stored energy



Test Circuits

Figure 14: Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

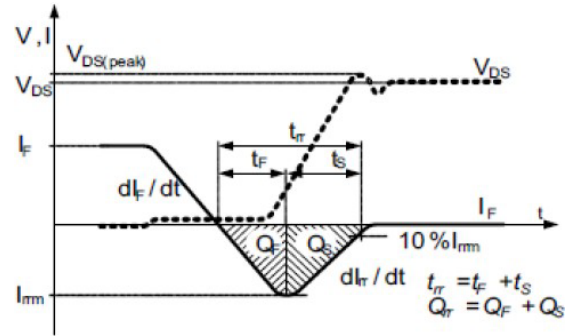
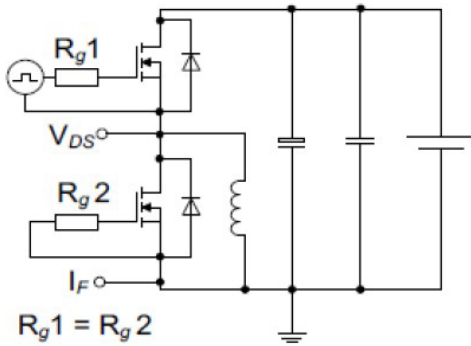


Figure 15: Switching Times

Switching times test circuit for inductive load and Switching times waveform

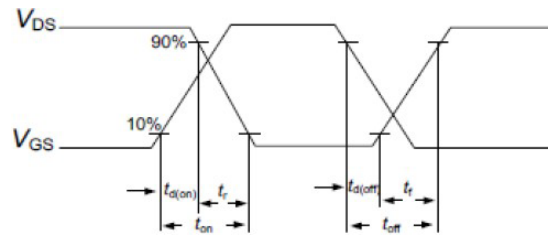
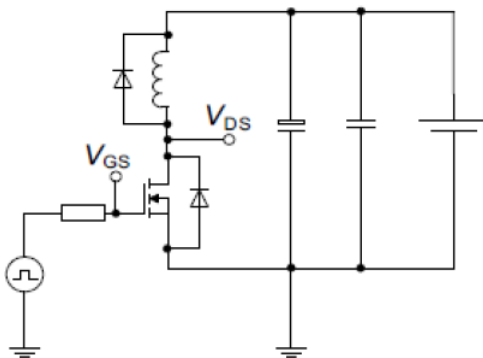
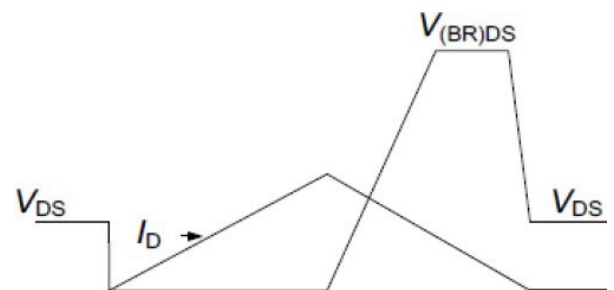
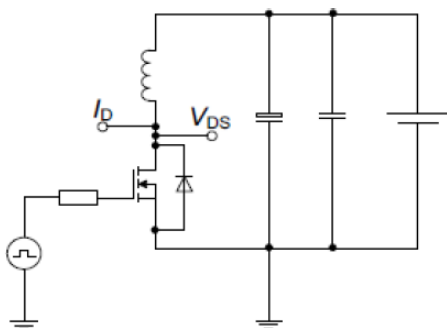


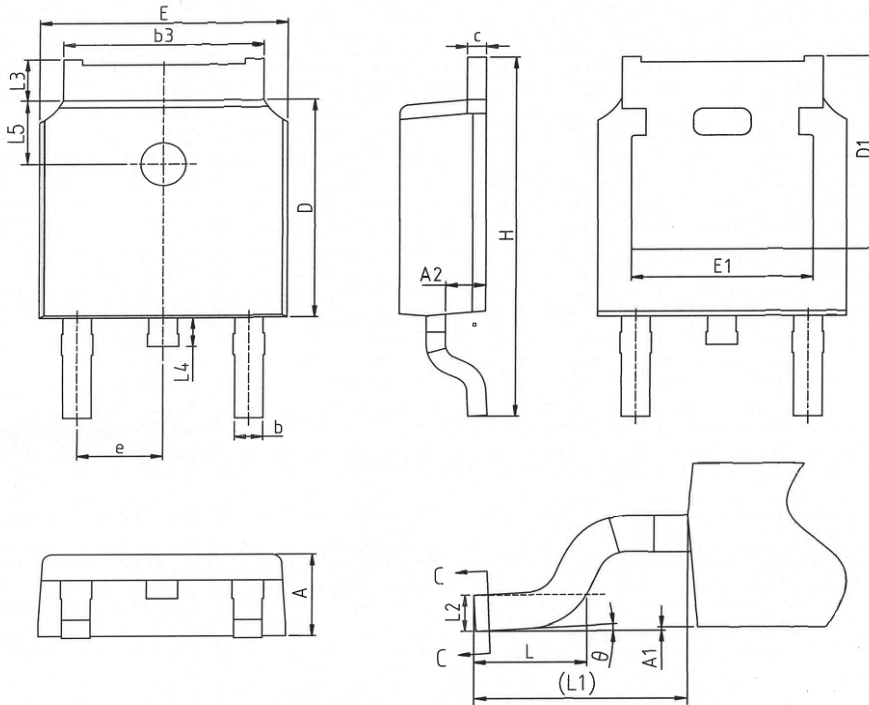
Figure 16: Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

D-Pak



COMMON DIMENSIONS

| SYMBOL | mm | | |
|--------|----------|-------|-------|
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.00 | - | 0.12 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.90 |
| b3 | 5.20 | 5.33 | 5.46 |
| c | 0.43 | 0.53 | 0.61 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | 5.30REF | | |
| E | 6.40 | 6.60 | 6.73 |
| E1 | 4.63 | - | - |
| e | 2.286BSC | | |
| H | 9.40 | 10.10 | 10.50 |
| L | 1.38 | 1.50 | 1.75 |
| L1 | 2.90REF | | |
| L2 | 0.51BSC | | |
| L3 | 0.88 | - | 1.28 |
| L4 | 0.50 | - | 1.00 |
| L5 | 1.65 | 1.80 | 1.95 |
| θ | 0° | - | 8° |

* Dimensions in millimeters

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