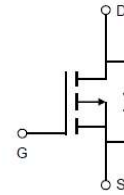


AP70P03K

P-Channel Enhancement Mosfet

Features

- -30V, -70A
 $R_{DS(ON)} < 10.0m\Omega @ V_{GS} = -10V$ TYP:7.0m Ω
 $R_{DS(ON)} < 13.0m\Omega @ V_{GS} = -4.5V$ TYP:10.0m Ω
- Advanced Trench Technology
- High Power and current handing capability
- Lead free product is acquired



Schematic Diagram



Marking and pin assignment

Applications

- Load Switch
- PWM Application
- Power management

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|----------|----------------|-----------|------------|----------------|
| 70P03K | AP70P03K | TO-252 | - | - | 2500 |

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-----------|--------------------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ($T_c = 25^\circ\text{C}$) | I_D | -70 | A |
| Continuous Drain Current ($T_c = 100^\circ\text{C}$) | I_D | -50 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | -260 | A |
| Single Pulsed Avalanche Energy ⁽²⁾ | E_{AS} | 576 | mJ |
| Drain Power Dissipation | P_D | 40 | W |
| Thermal Resistance from Junction to Case ⁽²⁾ | $R_{\theta JC}$ | 3.15 | $^\circ\text{C/W}$ |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55~ +150 | $^\circ\text{C}$ |

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|---|------|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$ | -30 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = -30V, V_{GS} = 0V$ | - | - | -1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | - | ± 100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu A$ | -1.0 | -1.6 | -2.0 | V |
| Drain-source on-resistance ⁽³⁾ | $R_{DS(on)}$ | $V_{GS} = -10V, I_D = -30A$ | - | 7.0 | 10.0 | m Ω |
| | | $V_{GS} = -4.5V, I_D = -20A$ | | 10.0 | 13.0 | m Ω |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -20V, V_{GS} = 0V, f = 1.0MHz$ | - | 2150 | - | pF |
| Output Capacitance | C_{oss} | | - | 430 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 320 | - | |
| Gate resistance | R_g | $V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$ | | 2.2 | | Ω |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DS} = -15V, I_D = -15A,$ $R_G = 3\Omega, V_G = -10V$ | - | 11 | - | ns |
| Turn-on rise time | t_r | | - | 13 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 111 | - | |
| Turn-off fall time | t_f | | - | 51 | - | |
| Total Gate Charge | Q_g | $V_{DS} = -15V, I_D = -1A,$ $V_{GS} = -10V$ | - | 35 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 5 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 10 | - | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ^(a) | V_{SD} | $T_J = 25^\circ\text{C}, V_{GS} = 0V, I_S = -2A$ | - | - | -1.2 | V |
| Diode Forward current | I_S | $T_C = 25^\circ\text{C}$ | - | - | -70 | A |
| Body Diode Reverse Recovery Time | t_{rr} | $T_J = 25^\circ\text{C}, I_F = -2A, di/dt = 100A/\mu s$ | | 34 | | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | $T_J = 25^\circ\text{C}, I_F = -2A, di/dt = 100A/\mu s$ | | 180 | | nc |

Notes:

- a) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
b) EAS condition: $T_J = 25^\circ\text{C}, V_{DD} = -15V, V_G = -10V, R_G = 25\Omega, L = 0.5mH$
c) Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

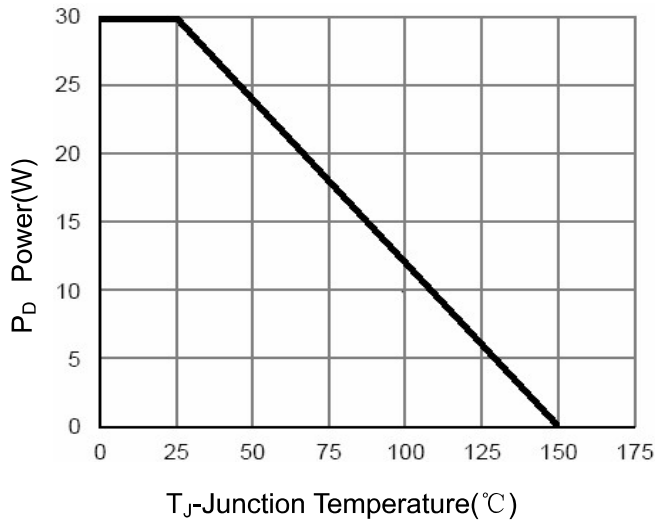


Figure 1 Power Dissipation

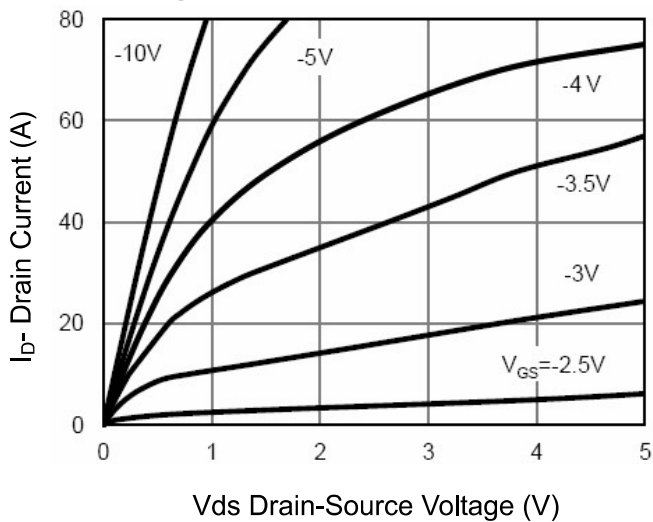


Figure 3 Output Characteristics

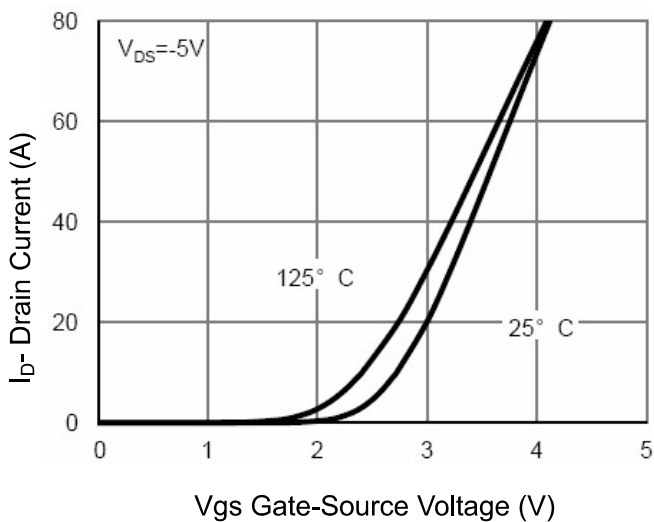


Figure 5 Transfer Characteristics

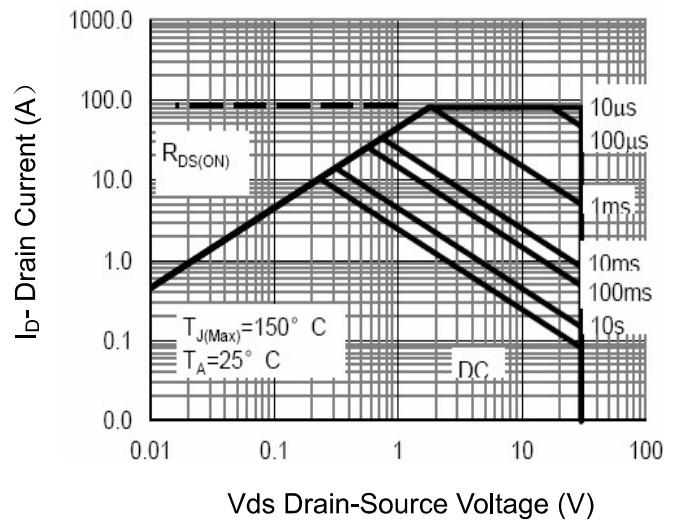


Figure 2 Safe Operation Area

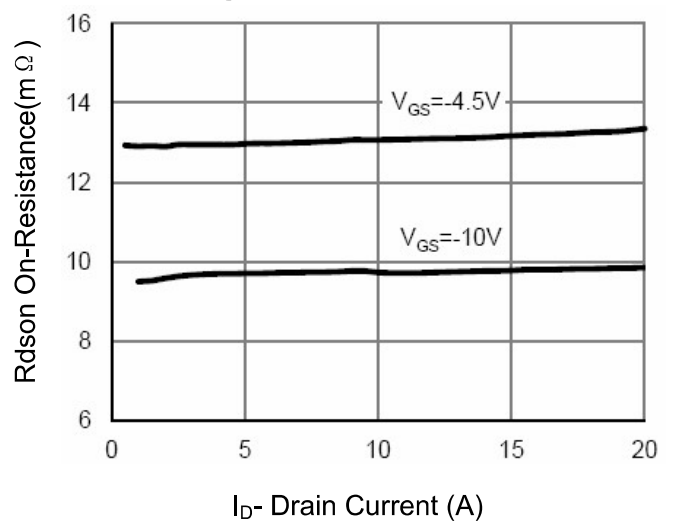


Figure 4 Drain-Source On-Resistance

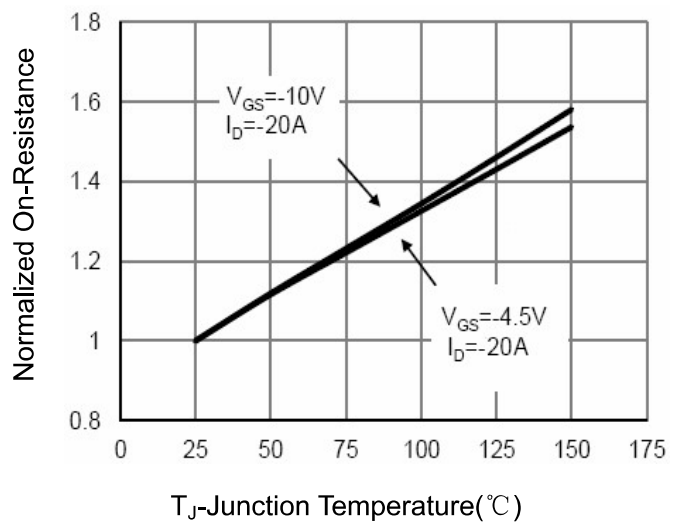


Figure 6 Drain-Source On-Resistance

Typical Performance Characteristics

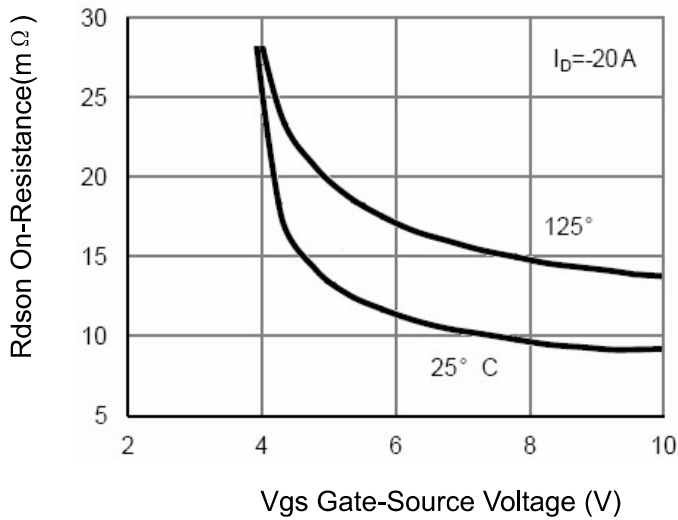


Figure 7 Rdson vs Vgs

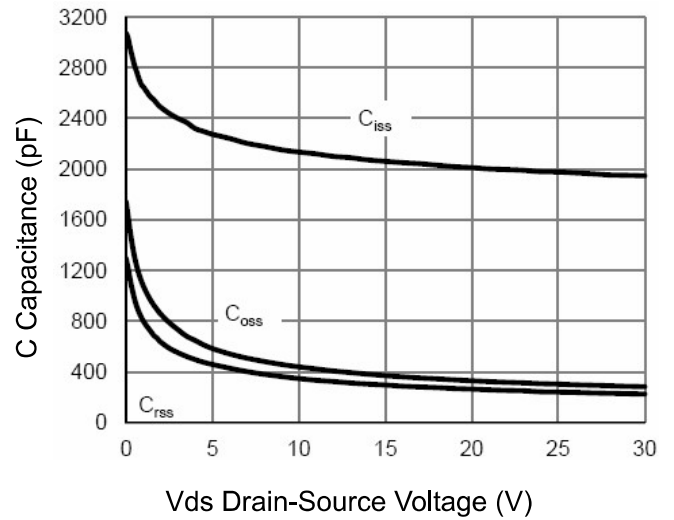


Figure 8 Capacitance vs Vds

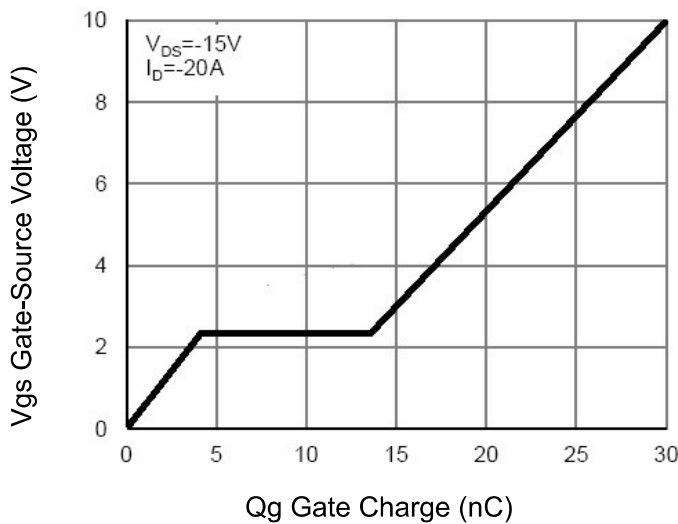


Figure 9 Gate Charge

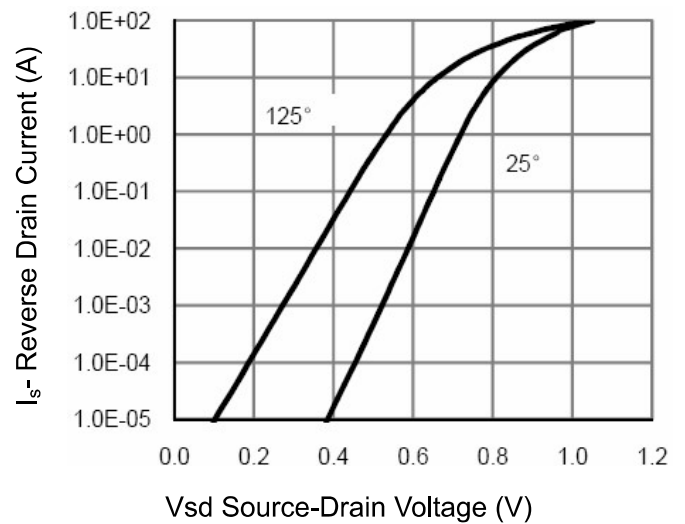


Figure 10 Source- Drain Diode Forward

Test Circuit

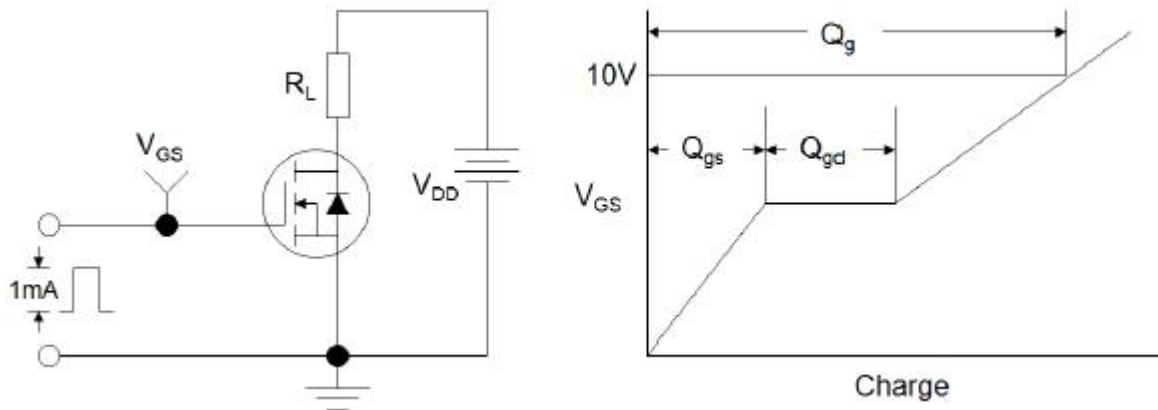


Figure1:Gate Charge Test Circuit & Waveform

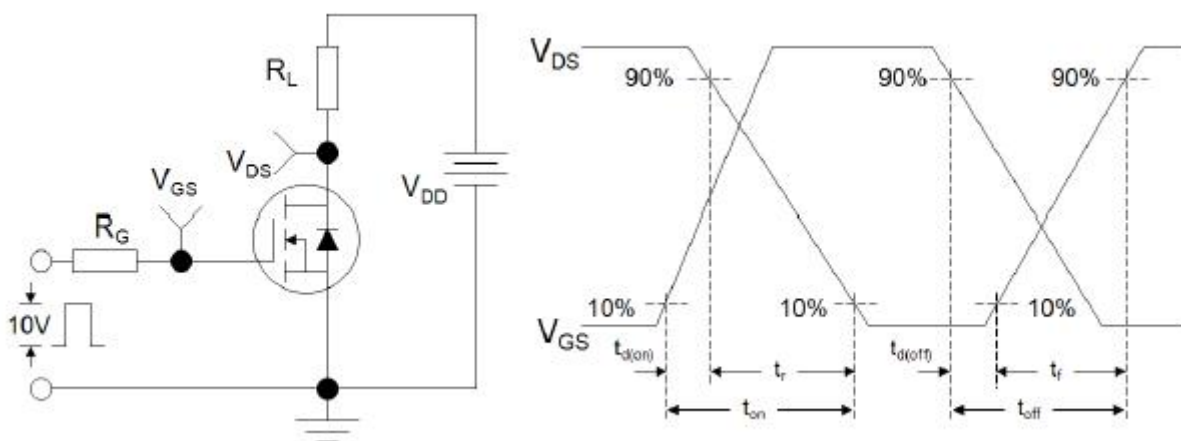


Figure 2: Resistive Switching Test Circuit & Waveforms

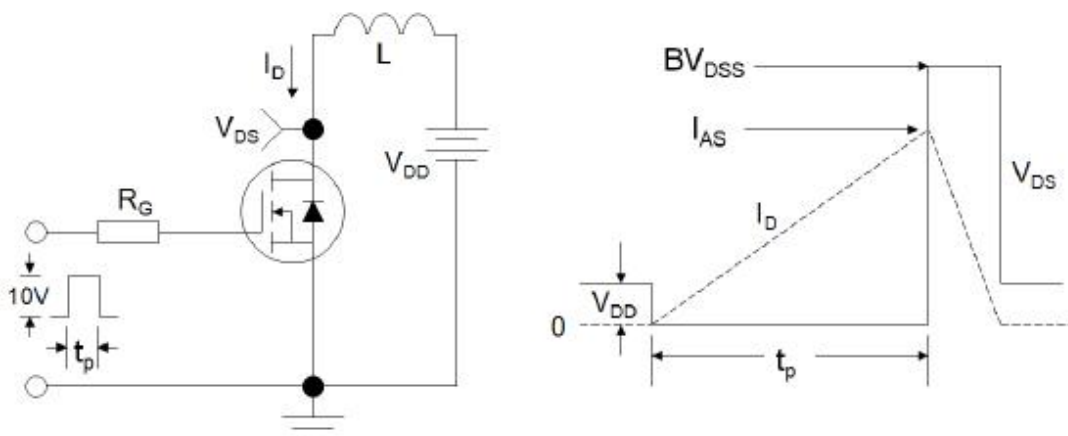
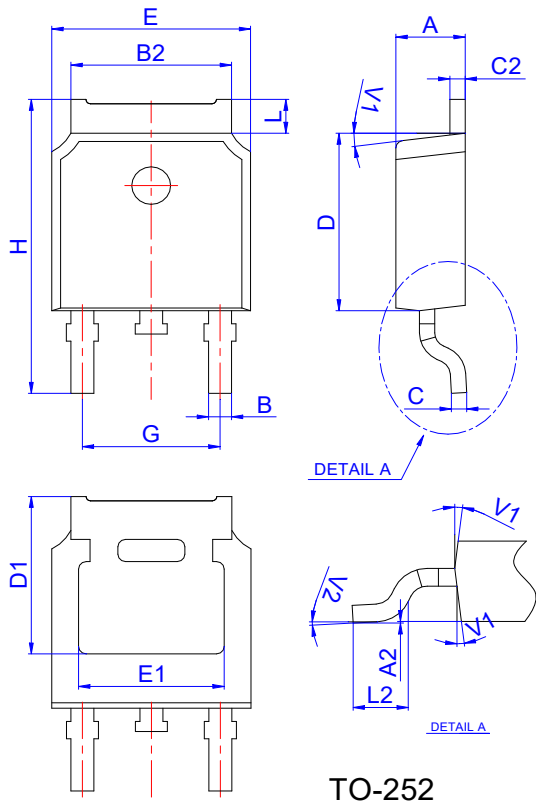


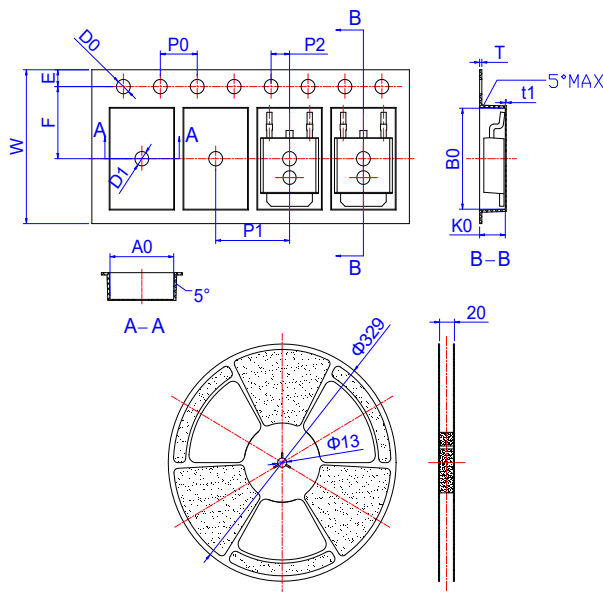
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-TO-252



| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|----------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | | 0° | 6° | 0° | | 6° |

Reel Specification-TO-252



| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | 15.90 | 16.00 | 16.10 | 0.626 | 0.630 | 0.634 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 7.40 | 7.50 | 7.60 | 0.291 | 0.295 | 0.299 |
| D0 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| D1 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| P0 | 3.90 | 4.00 | 4.10 | 0.154 | 0.157 | 0.161 |
| P1 | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| P2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| A0 | 6.85 | 6.90 | 7.00 | 0.270 | 0.271 | 0.276 |
| B0 | 10.45 | 10.50 | 10.60 | 0.411 | 0.413 | 0.417 |
| K0 | 2.68 | 2.78 | 2.88 | 0.105 | 0.109 | 0.113 |
| T | 0.24 | | 0.27 | 0.009 | | 0.011 |
| t1 | 0.10 | | | 0.004 | | |
| 10P0 | 39.80 | 40.00 | 40.20 | 1.567 | 1.575 | 1.583 |

Revision History

| Revision | Release | Remark |
|----------|------------|-----------------|
| V1.0 | 2023/02/20 | Initial Release |

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.

Allpower 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.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.