

20V N-Channel Enhancement Mode MOSFET

Description

The AP2222D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS}=20V$ $I_D=50A$

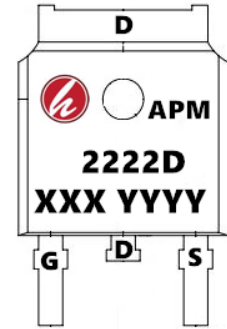
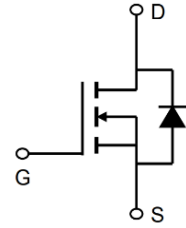
$R_{DS(ON)} < 10.5m\Omega$ @ $V_{GS}=4.5V$ (Type: $8.5m\Omega$)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|------------|-----------|------------------|----------|
| AP2222D | TO-252-3L | AP2222D XXX YYYY | 2500 |

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

| Symbol | Parameter | Max. | Units |
|------------|---|-------------|-------|
| VDSS | Drain-Source Voltage | 20 | V |
| VGSS | Gate-Source Voltage | ±12 | V |
| ID@TA=25°C | Continuous Drain Current, VGS @ 4.5V | 50 | A |
| ID@TA=70°C | Continuous Drain Current, VGS @ 4.5V | 20 | A |
| IDM | Pulsed Drain Current <small>note1</small> | 120 | A |
| EAS | Single Pulsed Avalanche Energy <small>note2</small> | 23 | mJ |
| PD@TA=25°C | Power Dissipation | 20 | W |
| RθJC | Thermal Resistance, Junction to Case | 7.5 | °C/W |
| TJ, TSTG | Operating and Storage Temperature Range | -55 to +150 | °C |



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Electrical Characteristics ($T_C=25^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|------------------|--|---|------|------|-----------|------------|
| V(BR)DSS | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 20 | 24 | - | V |
| IDSS | Zero Gate Voltage Drain Current | $V_{DS}=20V, V_{GS}=0V,$ | - | - | 1.0 | μA |
| IGSS | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 12V$ | - | - | ± 100 | nA |
| VGS(th) | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.5 | 0.75 | 1.2 | V |
| RDS(on) | Static Drain-Source on-Resistance note3 | $V_{GS}=4.5V, I_D=15A$ | - | 8.5 | 10.5 | m Ω |
| | | $V_{GS}=2.5V, I_D=10A$ | - | 11.7 | 17.5 | |
| C _{iss} | Input Capacitance | $V_{DS}=10V, V_{GS}=0V,$ $f=1.0\text{MHz}$ | - | 1000 | 1500- | pF |
| C _{oss} | Output Capacitance | | - | 182 | - | pF |
| Crss | Reverse Transfer Capacitance | | - | 164 | - | pF |
| Q _g | Total Gate Charge | $V_{DS}=10V, I_D=15A,$ $V_{GS}=4.5V$ | - | 15 | - | nC |
| Q _{gs} | Gate-Source Charge | | - | 2 | - | nC |
| Q _{gd} | Gate-Drain("Miller") Charge | | - | 5.2 | - | nC |
| td(on) | Turn-on Delay Time | $V_{DS}=10V,$ $I_D=15A, R_{GEN}=3\Omega,$ $V_{GS}=4.5V$ | - | 9 | - | ns |
| t _r | Turn-on Rise Time | | - | 25 | - | ns |
| td(off) | Turn-off Delay Time | | - | 37 | - | ns |
| t _f | Turn-off Fall Time | | - | 14 | - | ns |
| IS | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 30 | A |
| ISM | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 120 | A |
| VSD | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=30A$ | - | - | 1.2 | V |

Notes:

- 1、Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2、The test condition is, VDD=10V, VG=4.5V, L=0.5mH, RG=25 Ω , IAS=9.6A
- 3、The data tested by pulsed Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$
- 4、The power dissipation is limited by 150 $^\circ\text{C}$ junction temperature

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Typical Characteristics

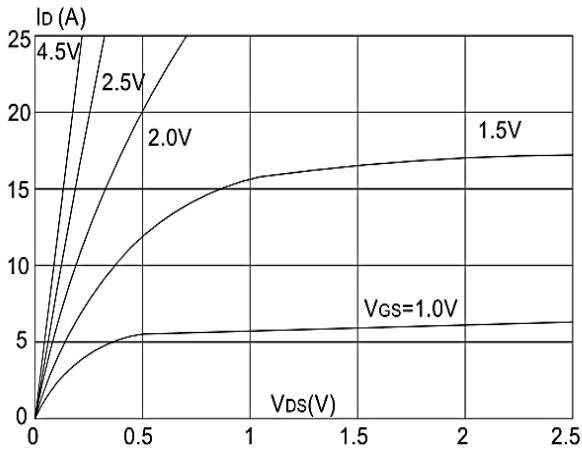


Figure 1: Output Characteristics

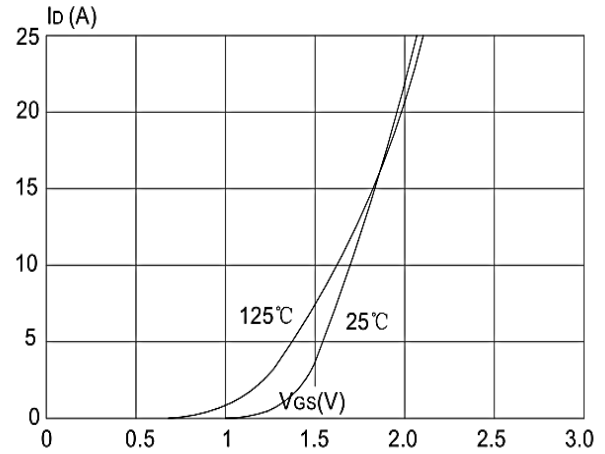


Figure 2: Typical Transfer Characteristics

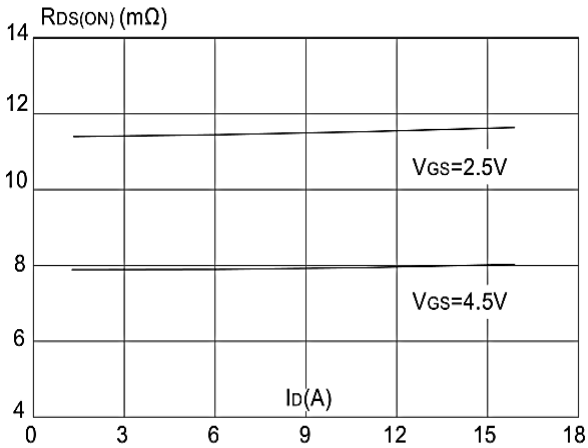


Figure 3: On-resistance vs. Drain Current

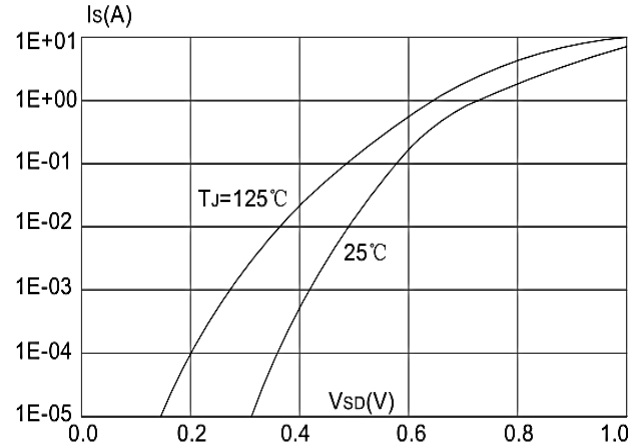


Figure 4: Body Diode Characteristics

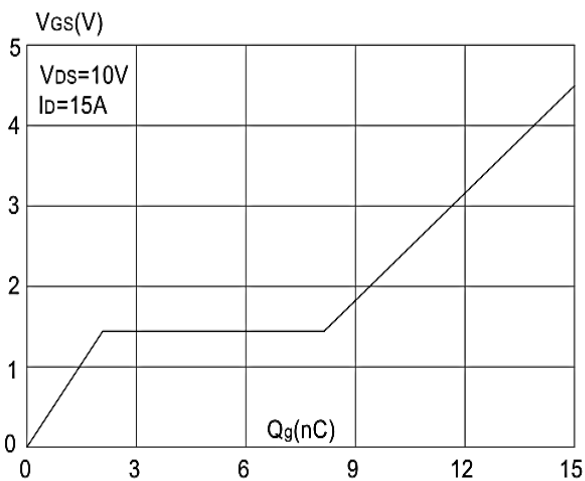


Figure 5: Gate Charge Characteristics

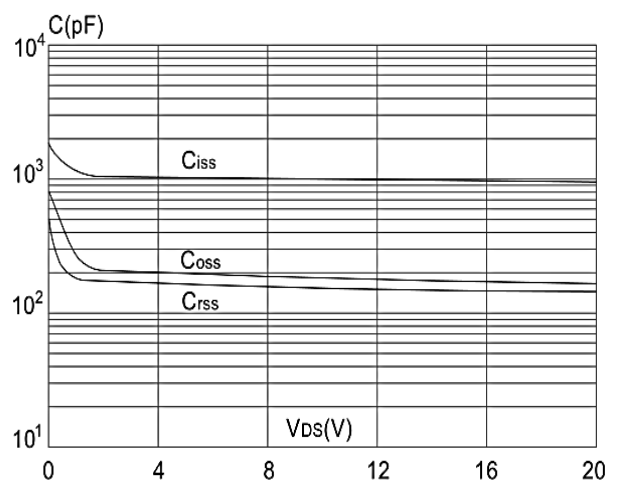


Figure 6: Capacitance Characteristics



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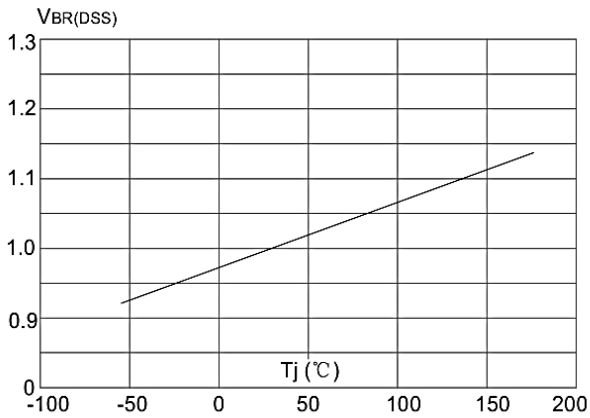


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

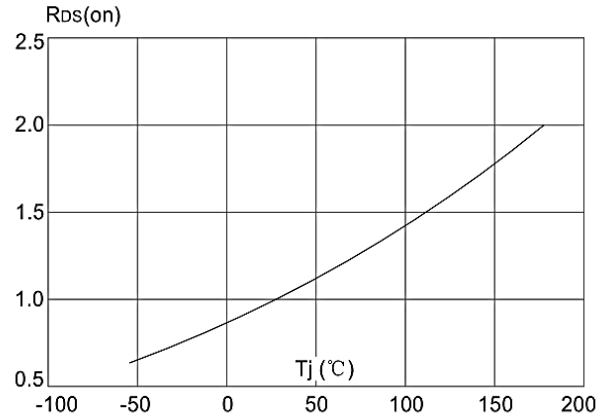


Figure 8: Normalized on Resistance vs. Junction Temperature

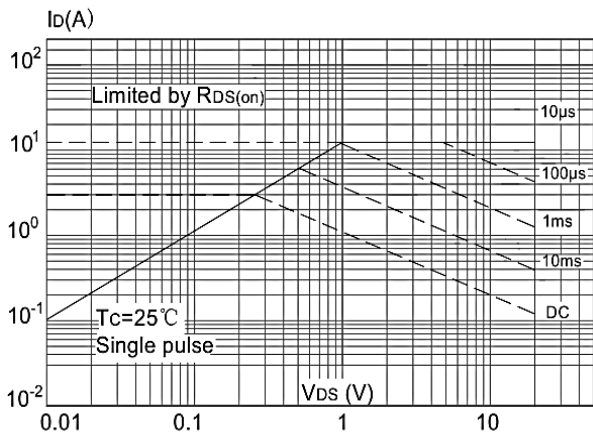


Figure 9: Maximum Safe Operating Area Current Temperature

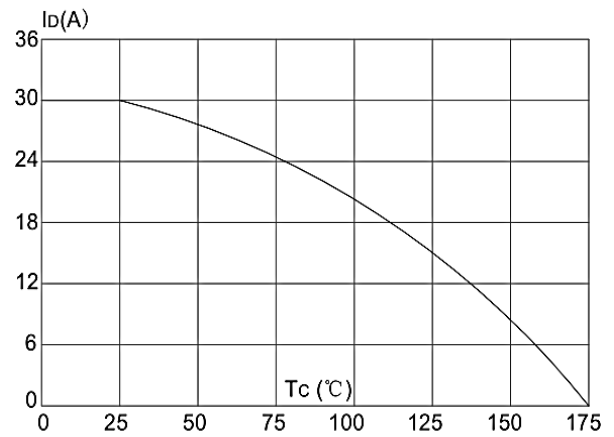


Figure 10: Maximum Continuous Drain vs. Case

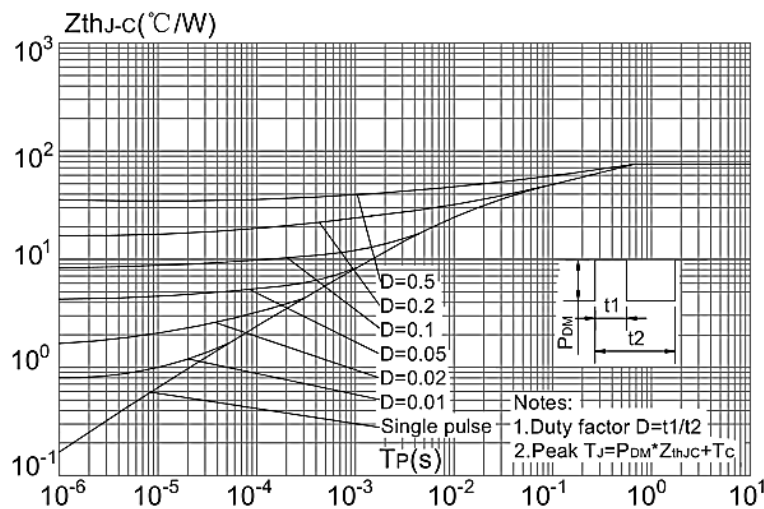
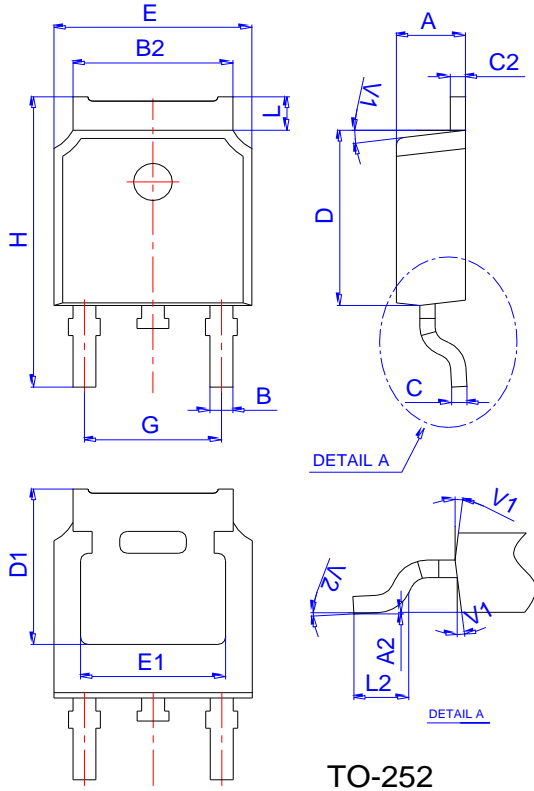


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

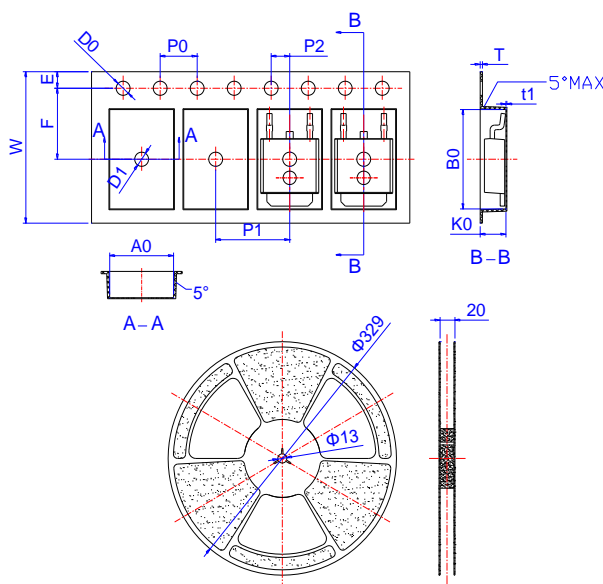
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Package Mechanical Data:TO-252-3L



| 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 |

20V N-Channel Enhancement Mode MOSFET**Attention**

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| Edition | Date | Change |
|---------|-----------|-----------------|
| Rve1.0 | 2018/8/31 | Initial release |

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