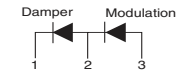
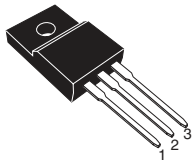
# DMV1500SD

## Damper + modulation diode for CRT TV

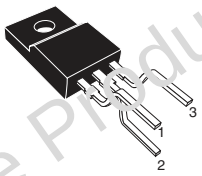
## Features

- Full kit in one package
- High breakdown voltage capability
- Very fast recovery diode
- Specified turn on switching characteristics
- Low static and peak forward voltage drop for low dissipation
- Insulated version:
  - Insulated voltage = 2000 $V_{RMS}$
  - Capacitance = 7 pF
- Planar technology allowing high quality and best electrical characteristics
- Outstanding performance of well proven DTV as damper and new faster Turbo 2 600 V technology as modulation




**TO-220FPAB**
**DMV1500SDFD**




**TO-220FPAB FD6 bending**
**DMV1500SDFD6 (optional)**

## Description

High voltage semiconductor especially designed for horizontal deflection stage in standard and high resolution video display with E/W correction.

The insulated TO-220FPAB package includes both the damper diode and the modulation diode, thanks to a dedicated design.

Assembled on automated line, it offers very low dispersion values on insulating and thermal performanes.

**Table 1. Device summary**

| Symbol | Damper | Modulation |
|---|---|---|
| $I_{F(AV)}$ | 6 A | 6 A |
| $I_{Fpeak}$ (max) | 12 A | 12 A |
| $V_{RRM}$ | 1500 V | 600 V |
| $t_{rr}$ (typ) | 150 ns | 60 ns |
| $V_F$ (typ) | 1.1 V | 1.0 V |
| $V_{FP}$ (typ) | 26 V | 5 V |

# 1 Characteristics

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | | Value | | Unit |
|---|---|---|---|---|---|
| | | | Damper | Modulation | |
| $V_{RRM}$ | Repetitive peak reverse voltage | | 1500 | 600 | V |
| $I_{Fpeak}$ | Peak working forward current | F = 56 kHz | 12 | 12 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | 50 | 50 | A |
| $T_{stg}$ | Storage temperature range | | -40 to +150 | | °C |
| $T_j$ | Maximum operating junction temperature | | 150 | | °C |

**Table 3. Thermal resistance**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case thermal resistance | 4.0 | °C/W |

**Table 4. Static electrical characteristics**

| Symbol | Parameter | Test conditions | | Value | | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | $T_j$ = 25 °C | | $T_j$ = 125 °C | | |
| | | | | Typ. | Max. | Typ. | Max. | |
| $I_R$ (1) | Reverse leakage current | **Damper** | $V_R$ = 1500 V | | 100 | 100 | 1000 | µA |
| | | **Modulation Modulation** | $V_R$ = 600 V | | 3 | 3 | 30 | |
| $V_F$ (2) | Forward voltage drop | **Damper** | $I_F$ = 6 A | 1.2 | 1.75 | 1.1 | 1.5 | V |
| | | **Modulation** | $I_F$ = 6 A | 1.15 | 1.4 | 1 | 1.25 | |

1. Pulse test: $t_p$ = 5 ms, δ < 2%
2. Pulse test: $t_p$ = 380 µs, δ < 2%

To evaluate the maximum conduction losses of the **damper** and **modulation** diodes use the following equations :

**Damper**: $P = 1.2 \times I_{F(AV)} + 0.050 \times I_F{}^2{}_{(RMS)}$

**Modulation**: $P = 0.89 \times I_{F(AV)} + 0.055 \times I_F{}^2{}_{(RMS)}$

**Table 5. Recovery characteristics**

| Symbol | Parameter | Test conditions | | Value | | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | Damper | | Modulation | | |
| | | | | Typ. | Max. | Typ. | Max. | |
| $t_{rr}$ | Reverse recovery time | $I_F$ = 100 mA<br>$I_R$ =100 mA<br>$I_{RR}$ = 10 mA | $T_j$ = 25 °C | 1000 | 2000 | 250 | 400 | ns |
| | | $I_F$ = 1 A<br>$dI_F/dt$ = -50 A/µs $V_R$ = 30 V | $T_j$ = 25 °C | 150 | 250 | 60 | 85 | |

**Table 6. Turn-on switching characteristics**

| Symbol | Parameter | Test conditions | | | Value | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Typ. | Max. | |
| $t_{fr}$ | Forward recovery time | **Damper** | $I_F$ = 6 A<br>$dI_F/dt$ = 80 A/µs<br>$V_{FR}$ = 3 V | $T_j$ = 100 °C | 350 | 500 | ns |
| | | **Modulation** | $I_F$ = 6 A<br>$dI_F/dt$ = 80 A/µs<br>$V_{FR}$ = 2 V | $T_j$ = 100 °C | 85 | 125 | |
| $V_{FP}$ | Peak forward voltage | **Damper** | $I_F$ = 6 A<br>$dI_F/dt$ = 80 A/µs | $T_j$ = 100 °C | 26 | 36 | V |
| | | **Modulation** | $I_F$ = 6 A<br>$dI_F/dt$ = 80 A/µs | $T_j$ = 100 °C | 5 | 7.5 | |

**Figure 1. Power dissipation vs. peak forward current (triangular waveform, δ = 0.45) (damper diode)**

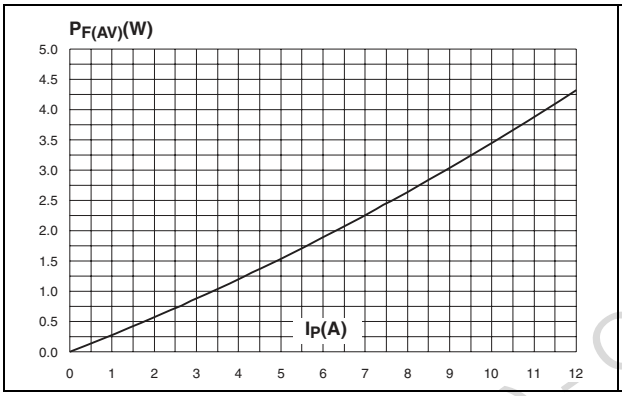



**Figure 2. Power dissipation vs. peak forward current (triangular waveform, δ = 0.45) (modulation diode)**

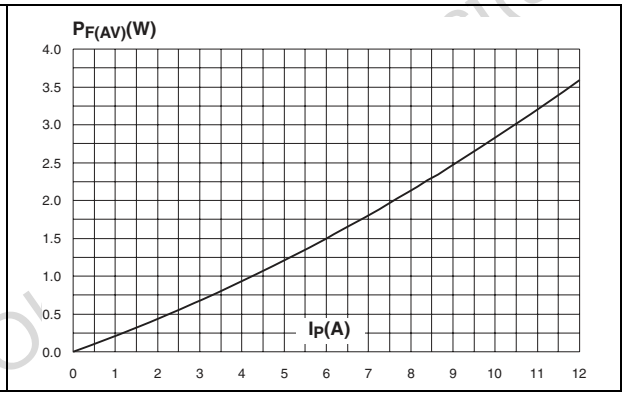



**Figure 3. Average forward current vs. ambient temperature**

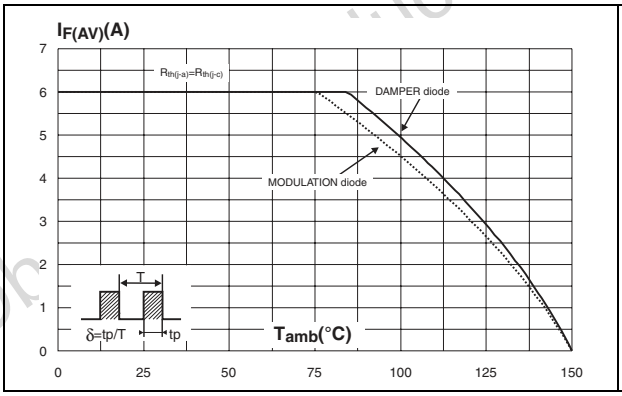



**Figure 4. Forward voltage drop vs. forward current (damper diode)**

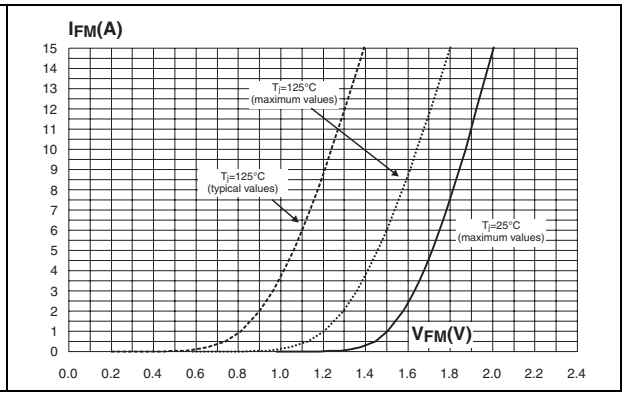


**Figure 5. Forward voltage drop vs. forward current (modulation diode)**

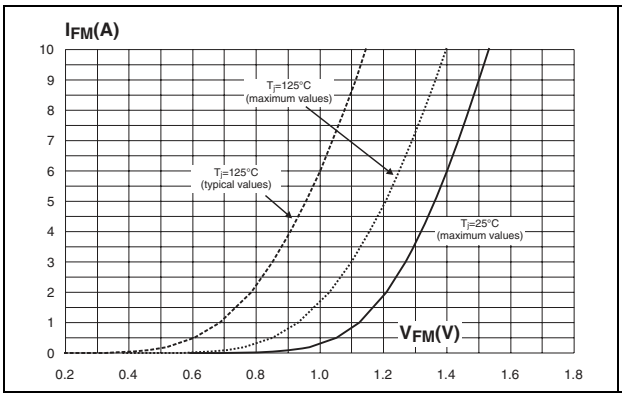



**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration**

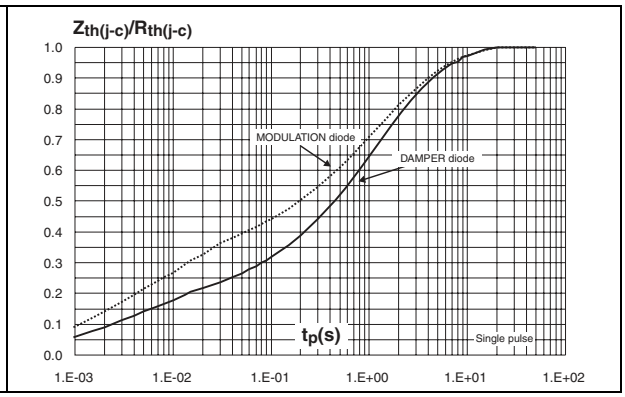



**Figure 7. Reverse recovery charges vs. $dI_F/dt$ (damper diode)**

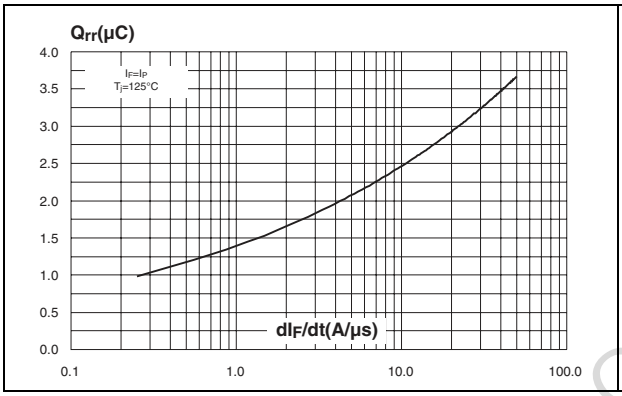



**Figure 8. Reverse recovery charges vs. $dI_F/dt$ (modulation diode)**

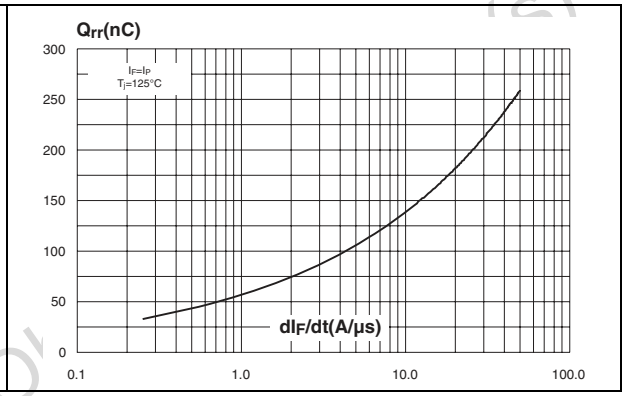



**Figure 9. Peak reverse recovery current vs. $dI_F/dt$ (damper diode)**

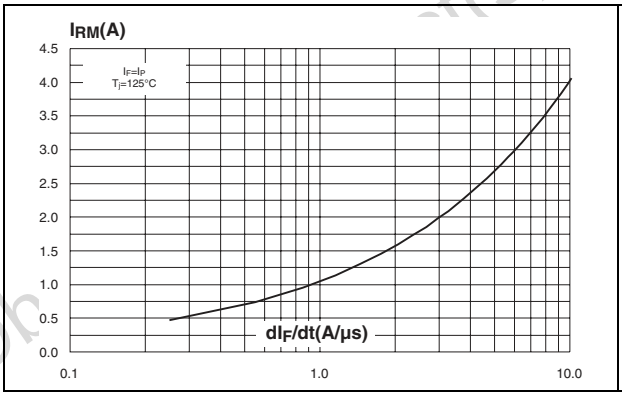



**Figure 10. Peak reverse recovery current vs. $dI_F/dt$ (modulation diode)**

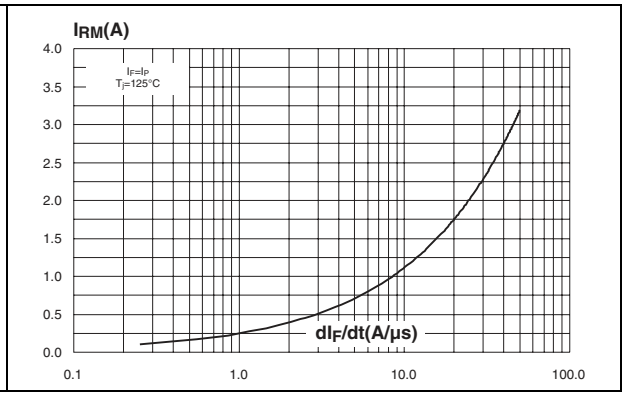


**Figure 11. Transient peak forward voltage vs. $dI_F/dt$ (damper diode, typical values)**

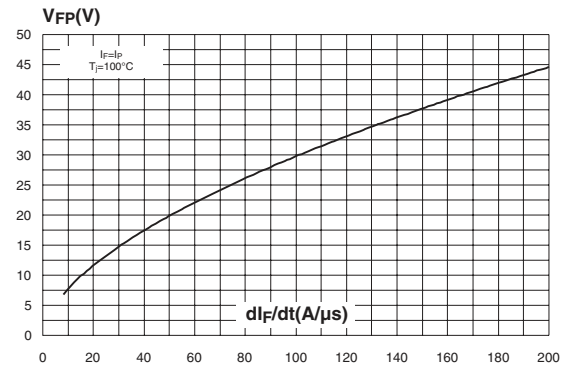



**Figure 12. Transient peak forward voltage vs. $dI_F/dt$ (modulation diode, typical values)**

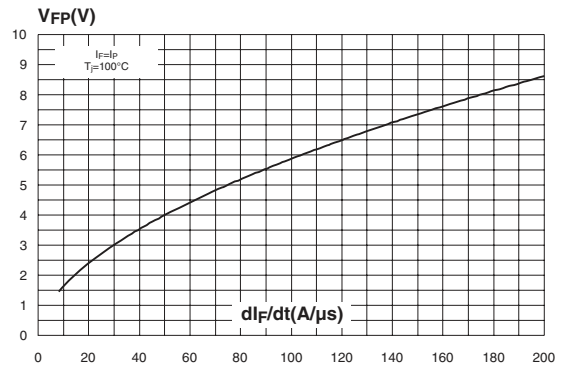



**Figure 13. Forward recovery time vs. $dI_F/dt$ (damper diode, typical values)**

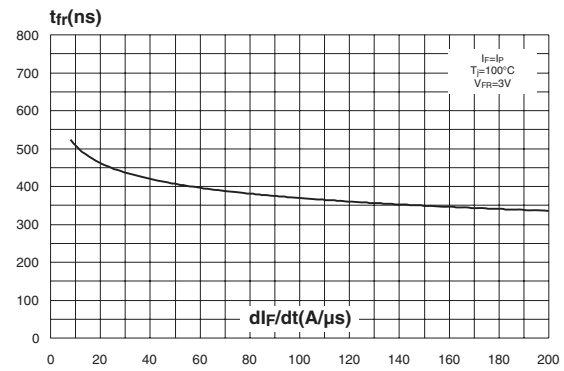



**Figure 14. Forward recovery time vs. $dI_F/dt$ (modulation diode, typical values)**

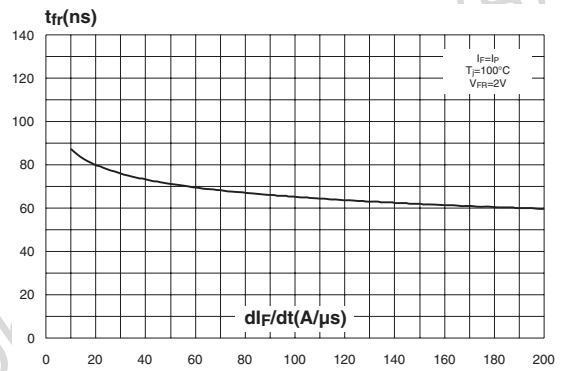



**Figure 15. Relative variation of dynamic parameters vs. junction temperature**

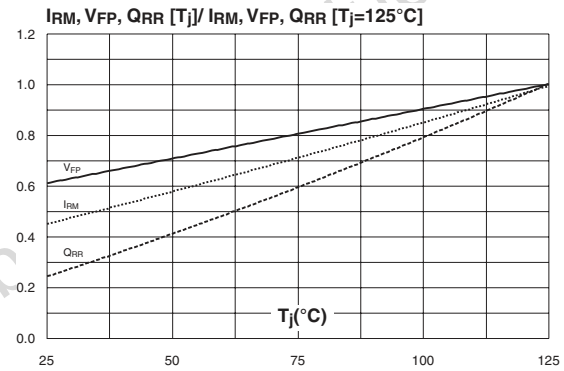
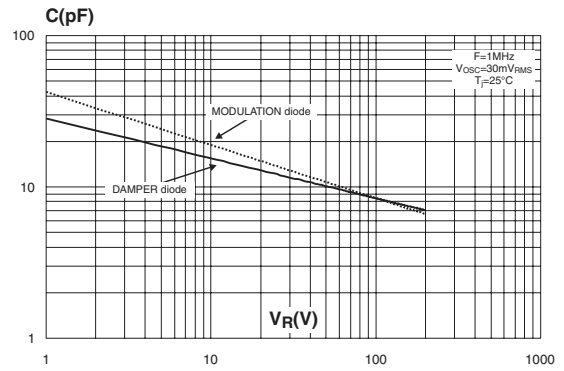



**Figure 16. Junction capacitance vs. reverse voltage applied (typical values)**

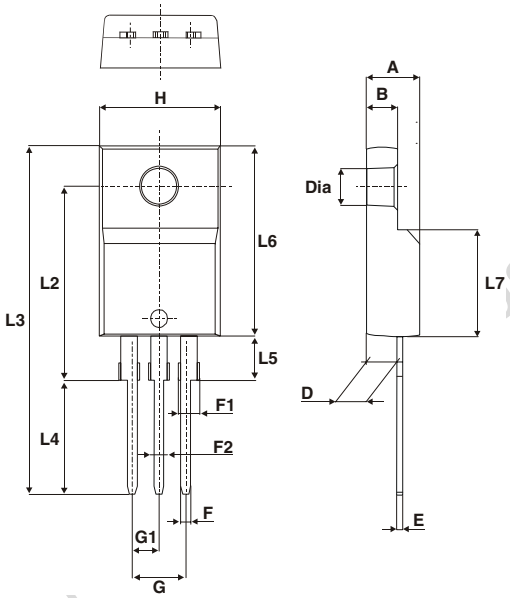


# 2 Package information

- Epoxy meets UL94,V0
- Recommended torque: 0.4 to 0.6 N·m

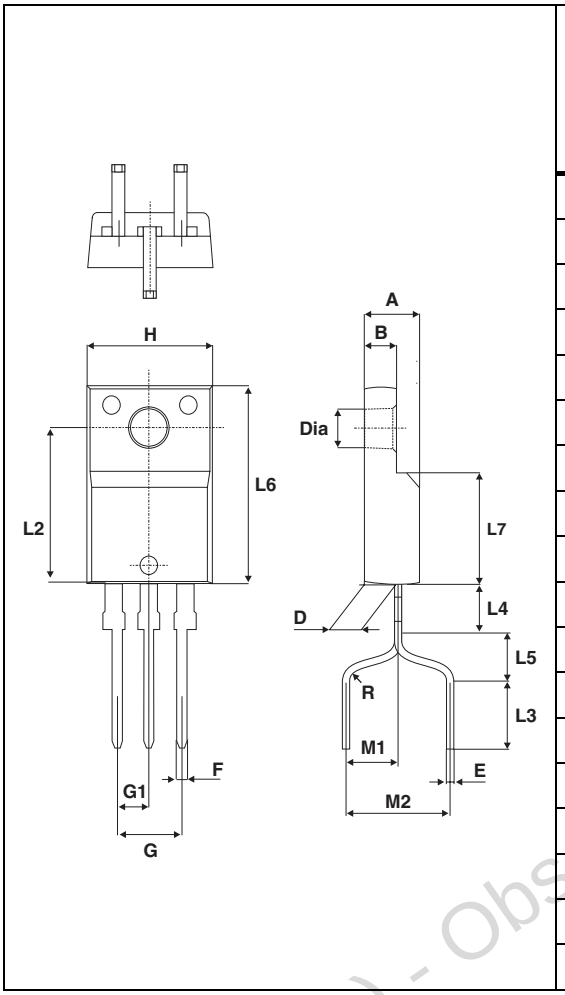
In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at *www.st.com*

**Table 7. TO-220FPAB dimensions**



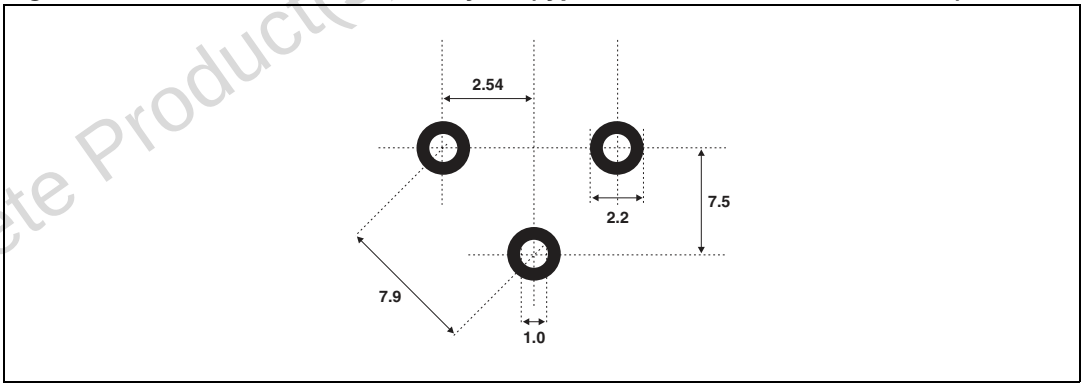

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.50 | 0.045 | 0.059 |
| F2 | 1.15 | 1.50 | 0.045 | 0.059 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

Table 8. TO-220FPAB F6 dimensions




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.9 | 0.173 | 0.192 |
| B | 2.5 | 2.9 | 0.098 | 0.114 |
| D | 2.45 | 2.75 | 0.096 | 0.108 |
| E | 0.4 | 0.7 | 0.016 | 0.028 |
| F | 0.6 | 1 | 0.024 | 0.039 |
| G | 4.8 | 5.3 | 0.195 | 0.205 |
| G1 | 2.2 | 2.95 | 0.094 | 0.106 |
| H | 10 | 10.7 | 0.394 | 0.421 |
| L2 | 12.7 | 12.8 | 0.500 | 0.504 |
| L3 | 4.8 Typ. | | 0.189 Typ. | |
| L4 | 3.4 | 4.8 | 0.150 | 0.165 |
| L5 | 2.9 Typ. | | 0.114 Typ. | |
| L6 | 15.8 | 16.4 | 0.622 | 0.646 |
| L7 | 9 | 9.9 | 0.354 | 0.390 |
| M1 | 3.75 Typ. | | 0.148 Typ. | |
| M2 | 7 | 8 | 0.276 | 0.315 |
| R | 1 Typ. | | 0.039 Typ. | |
| Dia. | 2.9 | 3.5 | 0.114 | 0.138 |

Figure 17. TO-220FPAB FD6 PCB layout (typical dimensions in millimeters)



# 3 Ordering information

**Table 9. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| DMV1500SDFD | DMV1500SD | TO-220FPAB | 2.4 g | 50 | Tube |
| DMV1500SDFD6 | DMV1500SD | TO-220FPAB FD6 | 2.4 g | 45 | Tube |

# 4 Revision history

**Table 10. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 25-Oct-2004 | 1 | First issue |
| 10-Dec-2004 | 2 | TO-220FPAB FD6 package mechanical data changes:<br>1. Ref. G: from 4.95 - 5.2 mm to 4.8 - 5.3 mm<br>2. Ref. G1: from 2.4 - 2.7 mm to 2.2 - 2.95 mm<br>3. Ref. L4: from 3.8 - 4.2 mm to 3.4 - 4.8 mm<br>4. Ref L5 addition: 2.9 mm typ. |
| 16-Mar-2005 | 3 | $I_{Fpeak}$ parameter included |
| 02-Dec-2008 | 4 | Reformatted to current standards. Updated ECOPACK statement.<br>Updated dimension illustration for TO-220FPAB FD6 in *Table 8*. |

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