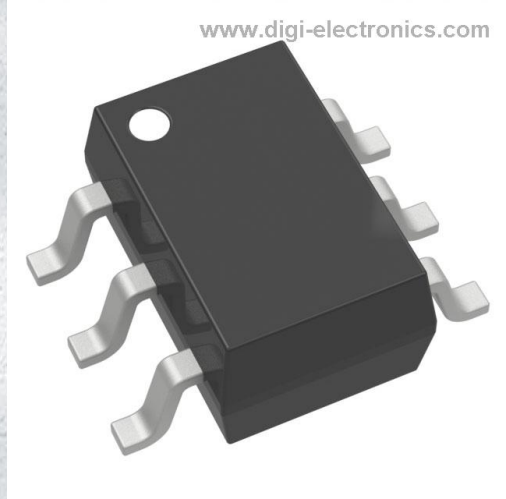
# DMN61D8LVT-13 Datasheet




https://www.DiGi-Electronics.com

| | |
|---|---|
| DiGi Electronics Part Number | DMN61D8LVT-13-DG |
| Manufacturer | Diodes Incorporated |
| Manufacturer Product Number | DMN61D8LVT-13 |
| Description | MOSFET 2N-CH 60V 0.63A TSOT26 |
| Detailed Description | Mosfet Array 60V 630mA 820mW Surface Mount TSOT-26 |

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| DMN61D8LVT-13 | Diodes Incorporated |
| Series: | Product Status: |
| - | Active |
| Technology: | Configuration: |
| MOSFET (Metal Oxide) | 2 N-Channel (Dual) |
| FET Feature: | Drain to Source Voltage (Vdss): |
| Logic Level Gate | 60V |
| Current - Continuous Drain (Id) @ 25°C: | Rds On (Max) @ Id, Vgs: |
| 630mA | 1.8Ohm @ 150mA, 5V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 2V @ 1mA | 0.74nC @ 5V |
| Input Capacitance (Ciss) (Max) @ Vds: | Power - Max: |
| 12.9pF @ 12V | 820mW |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 150°C (TJ) | Surface Mount |
| Package / Case: | Supplier Device Package: |
| SOT-23-6 Thin, TSOT-23-6 | TSOT-26 |
| Base Product Number: | |
| DMN61 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.21.0095 | |

Lead-free Green

# DMN61D8L/LVT

## 60V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ Max $T_A$ = +25°C, SOT23 |
|---|---|---|
| 60V | 1.8Ω @ $V_{GS}$ = 5V | 470mA |
| | 2.4Ω @ $V_{GS}$ = 3V | |

## Features and Benefits

- Provides a more reliable and robust interface between sensitive logic and DC relay coils
- Replaces 3 to 4 discrete components enabling PCB footprint to be reduced
- Internal active clamp removes the need for external zener diode
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **The Automotive-Compliant Parts are Available Under Separate Datasheets (DMN61D8LQ and DMN61D8LVTQ)**

## Description and Applications

DMN61D8L/LVT provides a single component solution for switching inductive loads such as relays, solenoids, and small DC motors in automotive applications, without the need of a freewheeling diode. DMN61D8L/LVT accepts logic level inputs, thus allowing it to be driven by logic gates, inverters, and microcontrollers. It is ideally suited for doors, windows, and antenna relay coils.

ESD Protected

## Mechanical Data

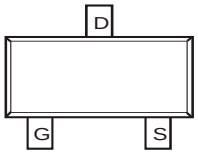
**Case: SOT23**

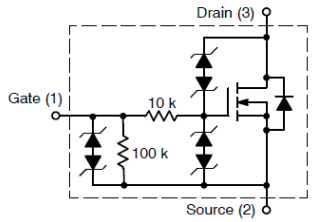
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Alloy 42 Leadframe. (Lead-Free Plating). Solderable per MIL-STD-202, Method 208 e3
- Terminals Connections: See Diagram
- Weight: 0.008 grams (Approximate)

**Case: TSOT26**

- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.013 grams (Approximate)

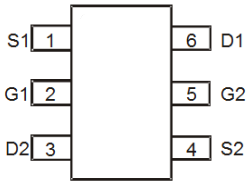
SOT23

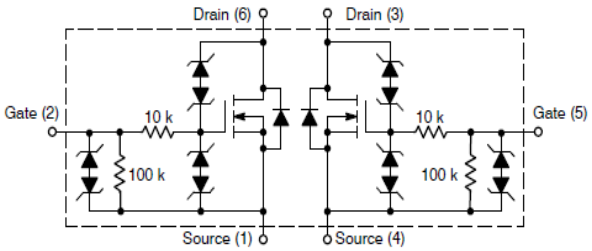



Equivalent Circuit

TSOT26




Top View

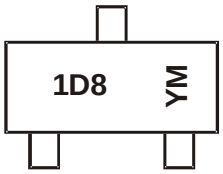
Top View
Internal Schematic

## Ordering Information (Note 4)

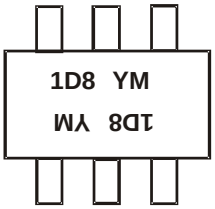
| Part Number | Case | Packaging |
|---|---|---|
| DMN61D8L-7 | SOT23 | 3,000/Tape & Reel |
| DMN61D8L-13 | SOT23 | 10,000/Tape & Reel |
| DMN61D8LVT-7 | TSOT26 | 3,000/Tape & Reel |
| DMN61D8LVT-13 | TSOT26 | 10,000/Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information




SOT23




TSOT26

1D8 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: F= 2018)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | B | C | D | E | F | G | H | I | J | K | L | M | N |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 60 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±12 | V |
| Continuous Drain Current (Note 6) SOT23 | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 470<br>370 | mA |
| Continuous Drain Current (Note 6) TSOT26 | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 630<br>500 | mA |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | $I_S$ | 0.5 | A |
| Single Pulse Drain-to-Source Avalanche Energy<br>(for relay coils/inductive loads of 80Ω or higher) ($T_J$ initial = +85°C) | | | $E_Z$ | 200 | mJ |
| Peak Power Dissipation, Drain-to-Source (non-repetitive current square pulse 1.0ms duration) ($T_J$ initial = +85°C) | | | $P_{PK}$ | 20 | W |
| Load Dump Pulse, Drain-to-Source, $R_{SOURCE}$ = 0.5Ω, t = 300ms)<br>(for relay coils/inductive loads of 80Ω or higher) ($T_J$ Initial = +85°C) | | | $E_{LD1}$ | 60 | V |
| Inductive Switching Transient 1, Drain-to-Source<br>(Waveform: $R_{SOURCE}$ = 10Ω, t = 2.0ms)<br>(for relay coils/inductive loads of 80Ω or higher) ($T_J$ Initial = +85°C) | | | $E_{LD2}$ | 100 | V |
| Inductive Switching Transient 2, Drain-to-Source<br>(Waveform: $R_{SOURCE}$ = 4.0Ω, t = 50µs)<br>(for relay coils/inductive loads of 80Ω or higher) ($T_J$ Initial = +85°C) | | | $E_{LD3}$ | 300 | V |
| Reverse Battery, 10 Minutes (Drain-to-Source)<br>(for relay coils/inductive loads of 80Ω or higher) | | | Rev−Bat | -14 | V |
| Dual Voltage Jump Start, 10 Minutes (Drain-to-Source) | | | Dual−Volt | 28 | V |
| ESD Human Body Model (HBM) | | | ESD | 4,000 | V |

## Thermal Characteristics (SOT23) (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | | $P_D$ | 390 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 321 | °C/W |
| Total Power Dissipation (Note 6) | | $P_D$ | 610 | mW |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 208 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Thermal Characteristics (TSOT26) (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | | $P_D$ | 820 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 154 | °C/W |
| Total Power Dissipation (Note 6) | | $P_D$ | 1090 | mW |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 116 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 60 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 10mA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 50<br>0.5 | μA | $V_{DS}$ = 60V, $V_{GS}$ = 0V<br>$V_{DS}$ = 12V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±90<br>±60 | μA | $V_{GS}$ = ±5V, $V_{DS}$ = 0V<br>$V_{GS}$ = ±3V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1.3 | — | 2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 1mA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 1.1<br>1.4 | 1.8<br>2.4 | Ω | $V_{GS}$ =5V, $I_D$ = 0.15A<br>$V_{GS}$ = 3V, $I_D$ = 0.15A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | 80 | — | — | ms | $V_{DS}$ =12V, $I_D$ = 0.15A |
| Diode Forward Voltage | $V_{SD}$ | — | — | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 0.15A |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 12.9 | — | pF | $V_{DS}$ = 12V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 17 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 0.84 | — | pF | |
| Total Gate Charge | $Q_g$ | — | 0.74 | — | nC | $V_{GS}$ = 5V, $V_{DS}$ = 12V,<br>$I_D$ =150mA |
| Gate-Source Charge | $Q_{gs}$ | — | 0.19 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 0.16 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 131 | — | ns | $V_{DD}$ = 12V, $V_{GS}$ = 5V |
| Turn-On Rise Time | $t_R$ | — | 301 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 582 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 440 | — | ns | |

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. copper, single sided.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

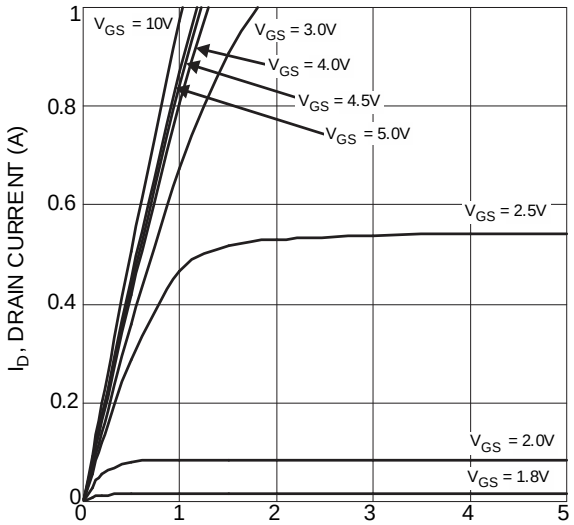



Figure 1 Typical Output Characteristic

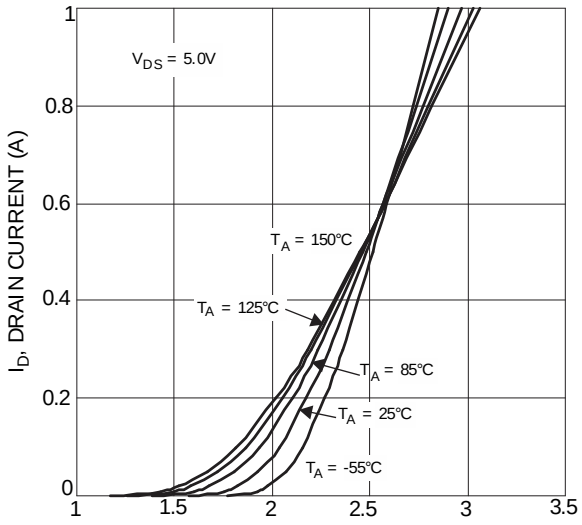



Figure 2 Typical Transfer Characteristics

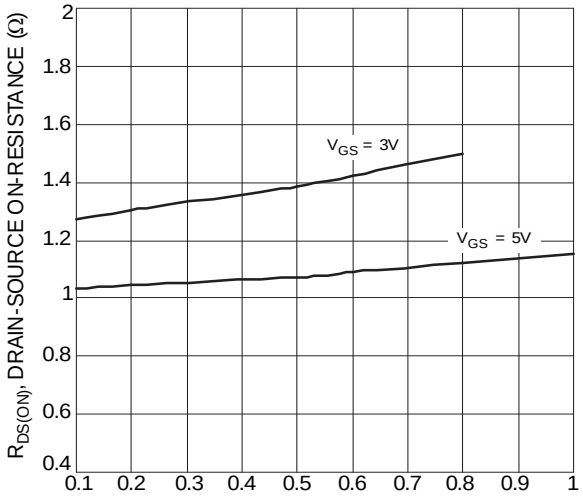



Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

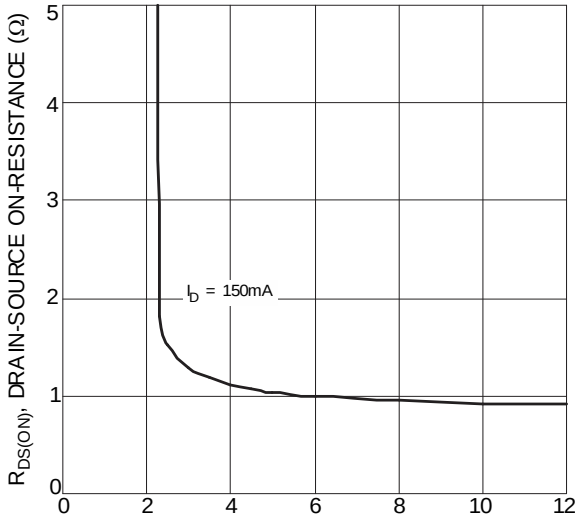



Figure 4 Typical Transfer Characteristic

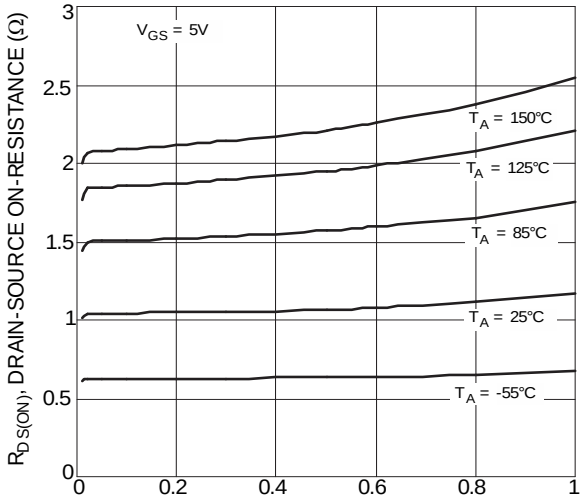



Figure 5 Typical On-Resistance vs. Drain Current and Temperature

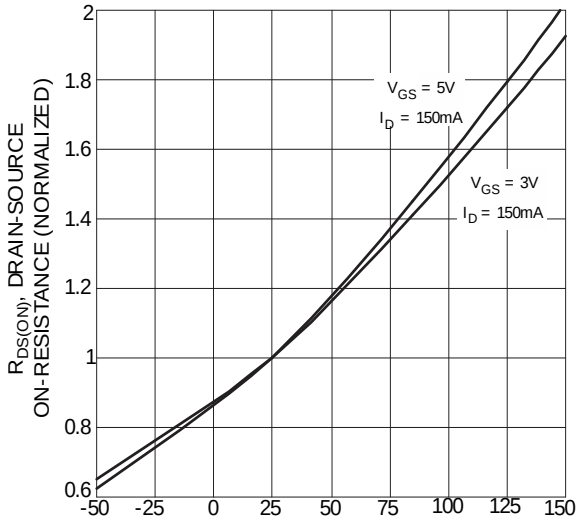



Figure 6 On-Resistance Variation with Temperature

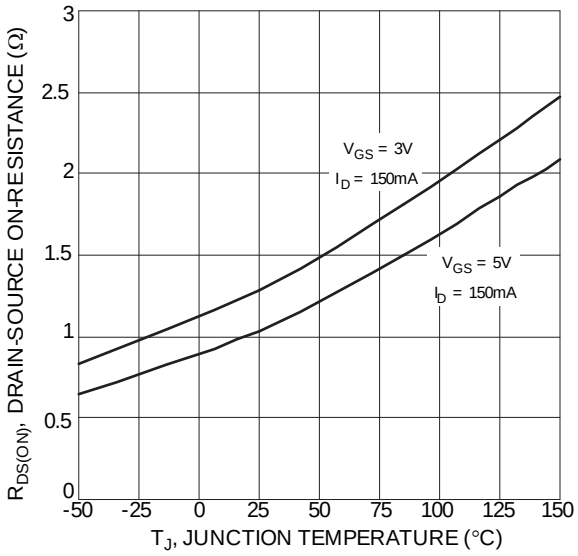



Figure 7 On-Resistance Variation with Temperature

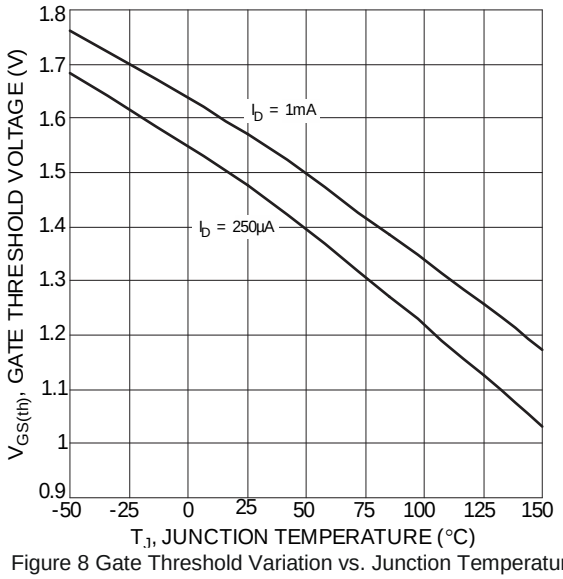



Figure 8 Gate Threshold Variation vs. Junction Temperature

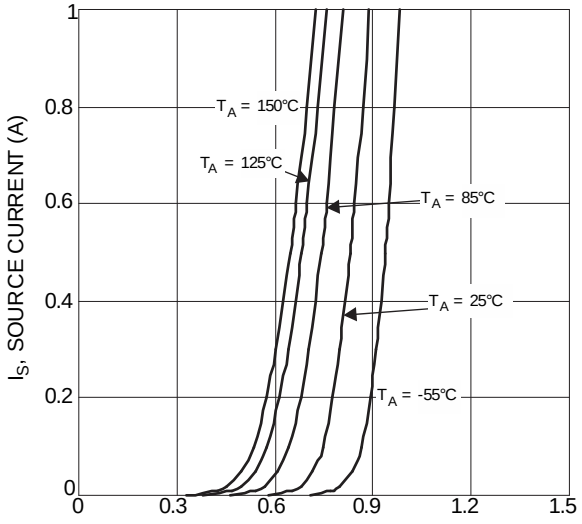



Figure 9 Diode Forward Voltage vs. Current

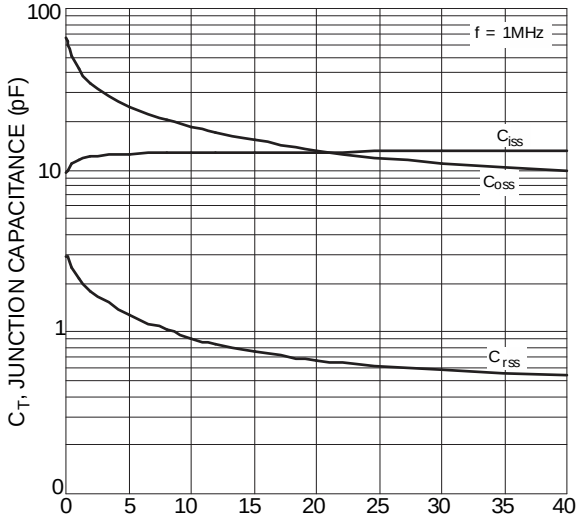



Figure 10 Typical Junction Capacitance

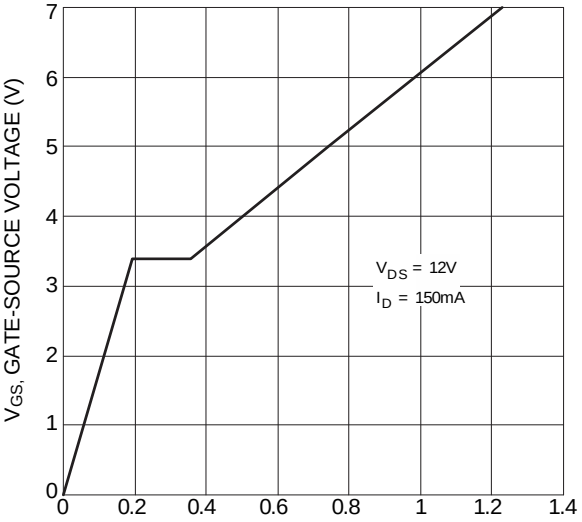



Figure 11 Gate Charge

**SOT23:**

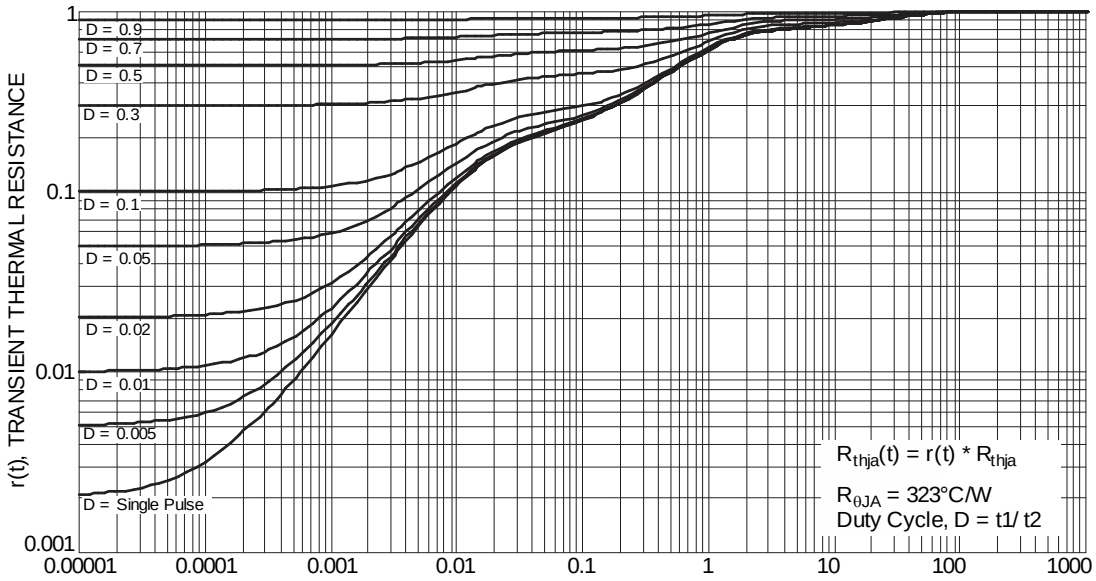



Figure 12 Transient Thermal Resistance

**TSOT26:**

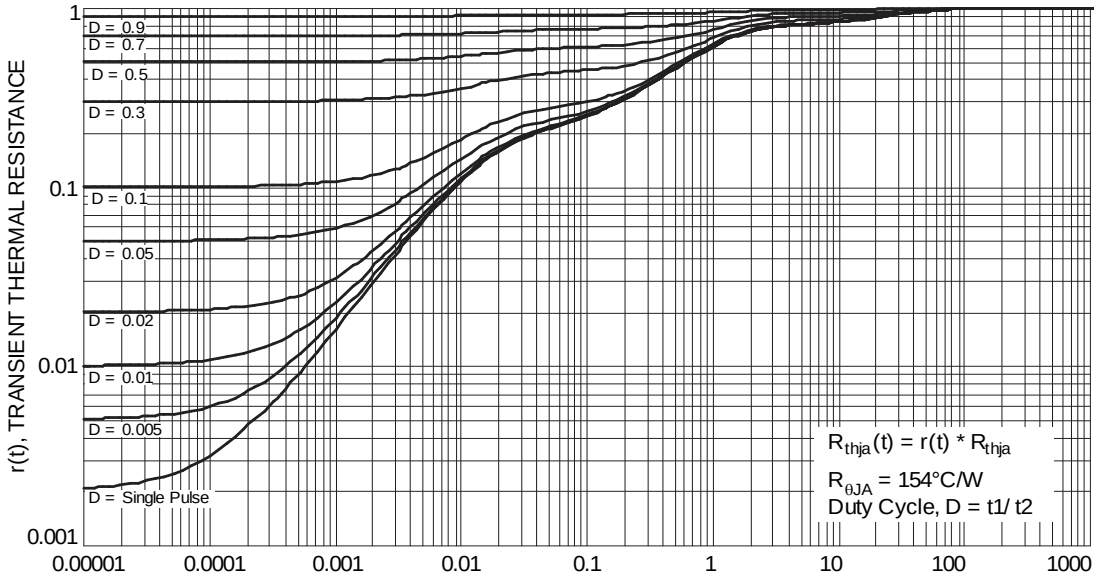
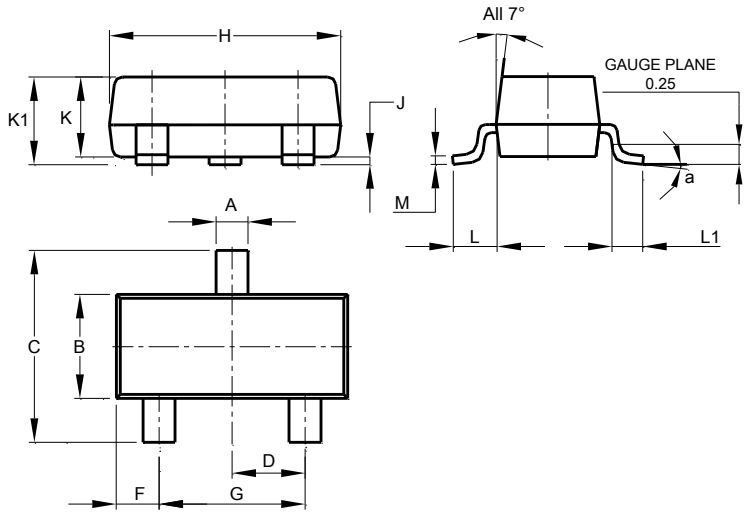



Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

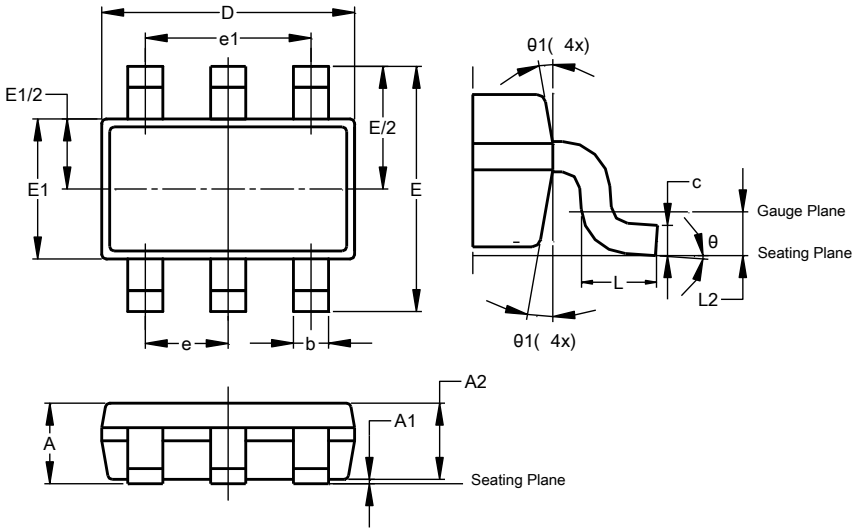
Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**




| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.890 | 1.00 | 0.975 |
| **K1** | 0.903 | 1.10 | 1.025 |
| **L** | 0.45 | 0.61 | 0.55 |
| **L1** | 0.25 | 0.55 | 0.40 |
| **M** | 0.085 | 0.150 | 0.110 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

**TSOT26**

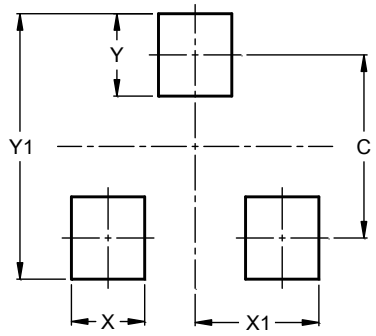



| TSOT26 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | – | 1.00 | – |
| **A1** | 0.010 | 0.100 | – |
| **A2** | 0.840 | 0.900 | – |
| **D** | 2.800 | 3.000 | 2.900 |
| **E** | 2.800 BSC | | |
| **E1** | 1.500 | 1.700 | 1.600 |
| **b** | 0.300 | 0.450 | – |
| **c** | 0.120 | 0.200 | – |
| **e** | 0.950 BSC | | |
| **e1** | 1.900 BSC | | |
| **L** | 0.30 | 0.50 | – |
| **L2** | 0.250 BSC | | |
| **θ** | 0° | 8° | 4° |
| **θ1** | 4° | 12° | – |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

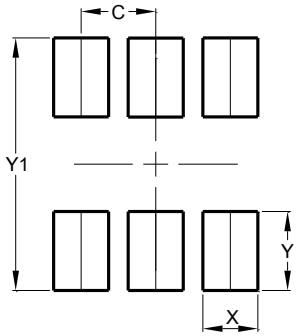
Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**




| Dimensions | Value (in mm) |
|---|---|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

**TSOT26**




| Dimensions | Value (in mm) |
|---|---|
| C | 0.950 |
| X | 0.700 |
| Y | 1.000 |
| Y1 | 3.199 |

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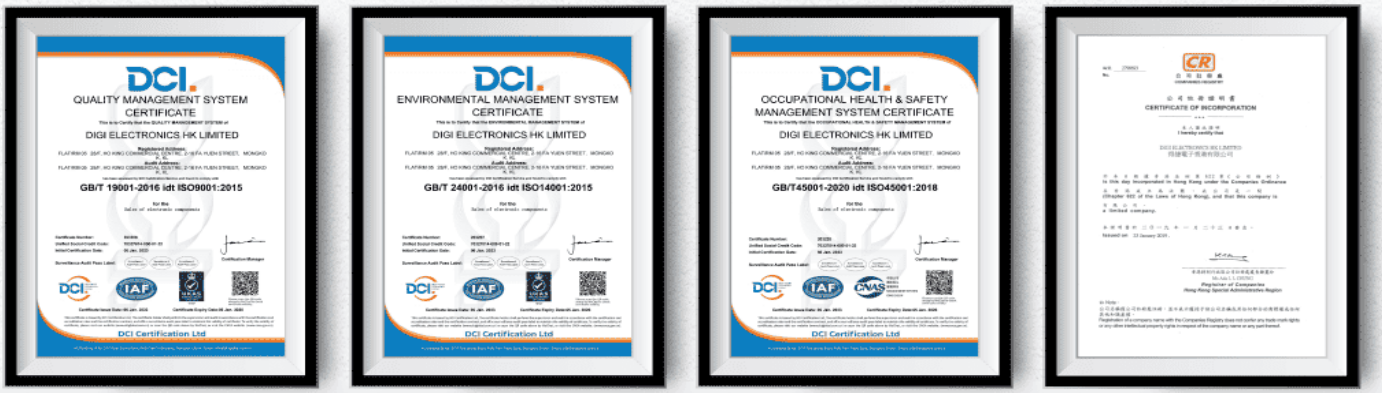



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

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