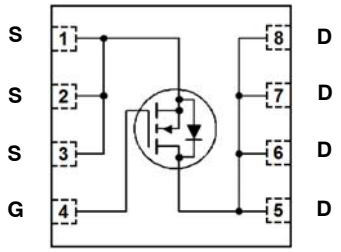
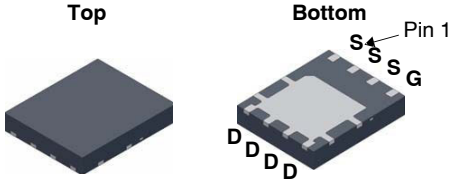
# MOSFET - Power, Single N-Channel, Shielded Gate, POWERTRENCH®
## 100 V, 124 A, 4.2 mΩ

# FDMS86181




N-Channel MOSFET




Power 56
(PQFN8)
CASE 483AE

### General Description

This N−Channel MV MOSFET is produced using **onsemi**'s advanced POWERTRENCH® process that incorporates Shielded Gate technology. This process has been optimized to minimise on−state resistance and yet maintain superior switching performance with best in class soft body diode.

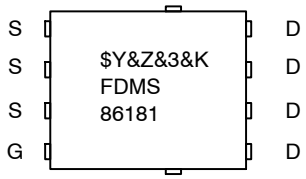
### Features

- Shielded Gate MOSFET Technology
- Max $r_{DS(on)}$ = 4.2 mΩ at $V_{GS}$ = 10 V, $I_D$ = 44 A
- Max $r_{DS(on)}$ = 12 mΩ at $V_{GS}$ = 6 V, $I_D$ = 22 A
- ADD
- 50% lower Qrr than other MOSFET suppliers
- Lowers switching noise/EMI
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

### Applications

- Primary DC−DC MOSFET
- Synchronous Rectifier in DC−DC and AC−DC
- Motor Drive
- Solar

### MARKING DIAGRAM




| | |
|---|---|
| $Y | = onsemi Logo |
| &Z | = Assembly Plant Code |
| &3 | = Data Code (Year & Week) |
| &K | = Lot |
| FDMS86181 | = Specific Device Code |

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

### MAXIMUM RATINGS ($T_A$ = 25°C unless otherwise noted)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain to Source Voltage | 100 | V |
| $V_{GS}$ | Gate to Source Voltage | ±20 | V |
| $I_D$ | Drain Current:<br>– Continuous $T_C$ = 25°C (Note 5)<br>– Continuous $T_C$ = 100°C (Note 5)<br>– Continuous $T_A$ = 25°C (Note 1a)<br>– Pulsed (Note 4) | <br>124<br>78<br>17<br>510 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy (Note 3) | 337 | mJ |
| $P_D$ | Power Dissipation:<br>$T_C$ = 25°C<br>$T_A$ = 25°C (Note 1a) | <br>125<br>2.5 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | −55 to +150 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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## PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device | Package | Quantity |
|---|---|---|---|
| FDMS86181 | FDMS86181 | Power 56 (PQFN8)<br>(Pb-Free / Halogen Free) | 3000/Tape&Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 1.0 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 50 | |

## ELECTRICAL CHARACTERISTICS ($T_J$ = 25°C unless otherwise noted)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $I_D$ = 250 μA, $V_{GS}$ = 0 V | 100 | | | V |
| $\Delta BV_{DSS}$ /$\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 μA, referenced to 25°C | | 60 | | mV/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 80 V, $V_{GS}$ = 0 V | | | 1 | μA |
| $I_{GSS}$ | Gate to Source Leakage Current, Forward | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V | | | 100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250 μA | 2.0 | 3.1 | 4.0 | V |
| $\Delta V_{GS(th)}$ /$\Delta T_J$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D$ = 250 μA, referenced to 25°C | | −9 | | mV/°C |
| $r_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS}$ = 10 V, $I_D$ = 44 A | | 3.3 | 4.2 | mΩ |
| | | $V_{GS}$ = 6 V, $I_D$ = 22 A | | 5.3 | 12 | |
| | | $V_{GS}$ = 10 V, $I_D$ = 44 A, $T_J$ = 125°C | | 5.7 | 7.8 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 10 V, $I_D$ = 44 A | | 116 | | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 50 V, $V_{GS}$ = 0 V, f = 1 MHz | | 2945 | 4125 | pF |
| $C_{oss}$ | Output Capacitance | | | 1730 | 2425 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 20 | 40 | pF |
| $R_g$ | Gate Resistance | f = 1MHz | 0.1 | 1.3 | 2.6 | Ω |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 50 V, $I_D$ = 44 A, $V_{GS}$ = 10 V, $R_{GEN}$ = 6 Ω | | 17 | 31 | ns |
| $t_r$ | Rise Time | | | 9 | 18 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 25 | 40 | ns |
| $t_f$ | Fall Time | | | 6 | 12 | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$ = 0 V to 10 V, $V_{DD}$ = 50 V, $I_D$ = 44 A | | 42 | 59 | nC |
| | | $V_{GS}$ = 0 V to 6 V, $V_{DD}$ = 50 V, $I_D$ = 44 A | | 27 | 38 | nC |
| $Q_{gs}$ | Gate to Source Charge | $V_{DD}$ = 50 V, $I_D$ = 44 A | | 13 | | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | | | 9.3 | | nC |

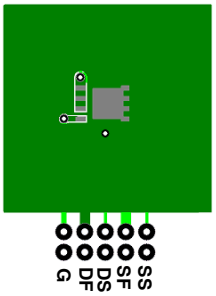
**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise noted) (continued)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **DRAIN-SOURCE DIODE CHARACTERISTICS** | | | | | | |
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 2.1 A (Note 2) | | 0.7 | 1.2 | V |
| | | $V_{GS}$ = 0 V, $I_S$ = 44 A (Note 2) | | 0.8 | 1.3 | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 20 A, di/dt = 300 A/μs | | 32 | 52 | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 57 | 92 | nC |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 20 A, di/dt = 1000 A/μs | | 25 | 40 | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 158 | 253 | nC |

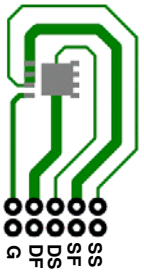
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 $in^2$ pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR−4 material. $R_{\theta CA}$ is determined by the user's board design.




a. 50 °C/W when mounted on a 1 $in^2$ pad of 2 oz copper.




b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. $E_{AS}$ of 337 mJ is based on starting $T_J$ = 25°C, N−ch: L = 3 mH, $I_{AS}$ = 15 A, $V_{DD}$ = 100 V, $V_{GS}$ = 10 V. 100% test at L = 0.1 mH, $I_{AS}$ = 49 A.
4. Pulsed Id please refer to Figure 11 SOA graph for more details.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro−mechanical application board design.

## TYPICAL CHARACTERISTICS

($T_J$ = 25°C UNLESS OTHERWISE NOTED)

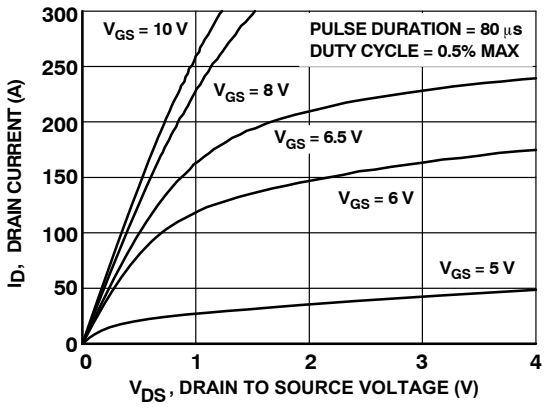



**Figure 1. On Region Characteristics**

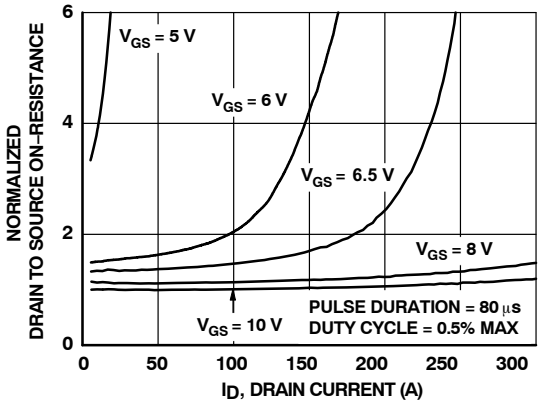



**Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage**

## TYPICAL CHARACTERISTICS (CONTINUED)

($T_J$ = 25°C UNLESS OTHERWISE NOTED)

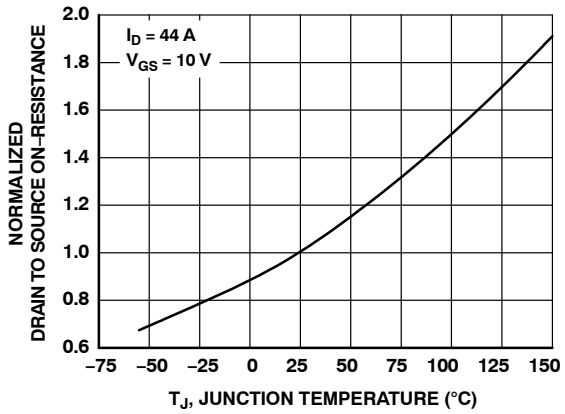



**Figure 3. Normalized On Resistance vs. Junction Temperature**

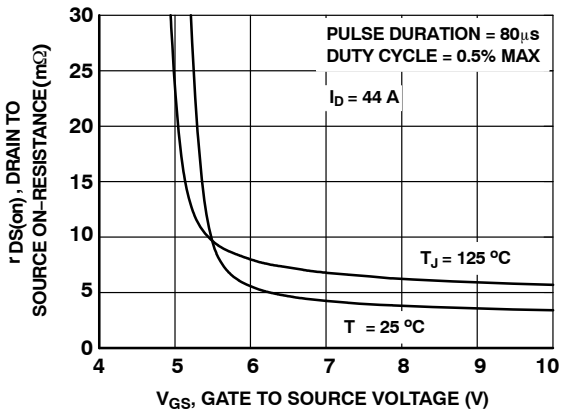



**Figure 4. On−Resistance vs. Gate to Source Voltage**

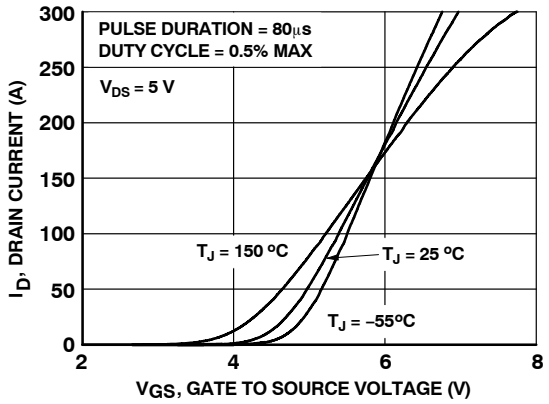



**Figure 5. Transfer Characteristics**

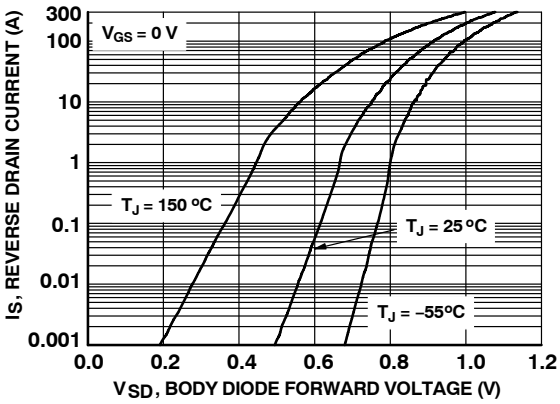



**Figure 6. Source to Drain Diode Forward Voltage vs. Source Current**

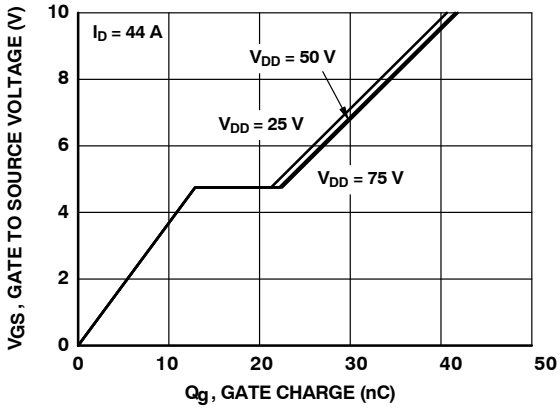



**Figure 7. Gate Charge Characteristics**

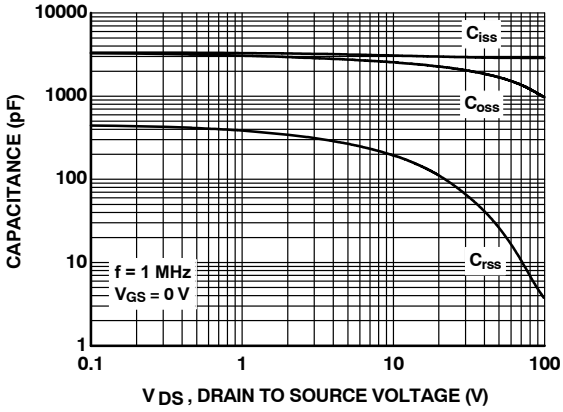



**Figure 8. Capacitance vs. Drain to Source Voltage**

## TYPICAL CHARACTERISTICS (CONTINUED)

($T_J$ = 25°C UNLESS OTHERWISE NOTED)

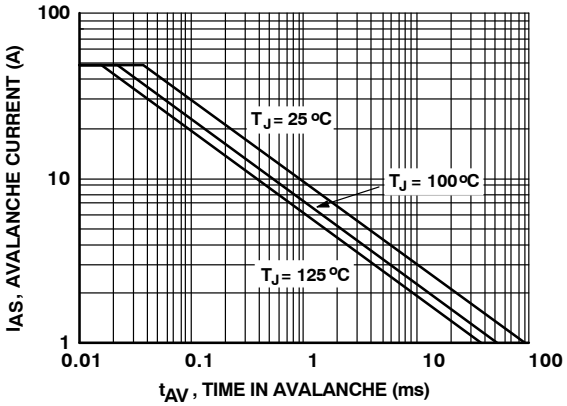



**Figure 9. Unclamped Inductive Switching Capability**

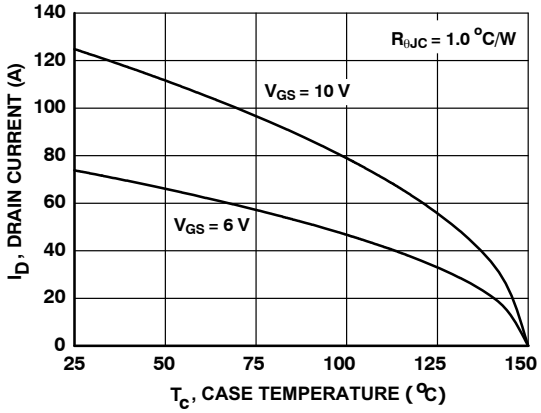



**Figure 10. Maximum Continuous Drain Current vs. Case Temperature**

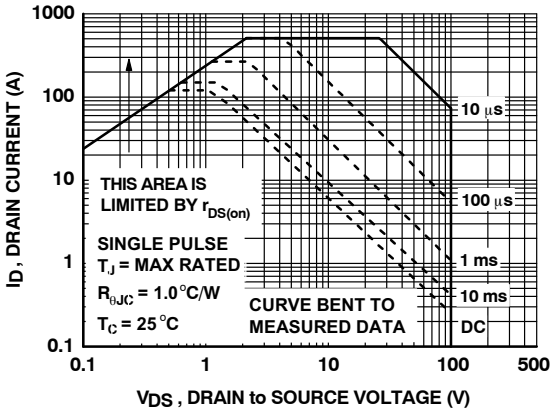



**Figure 11. Forward Bias Safe Operating Area**

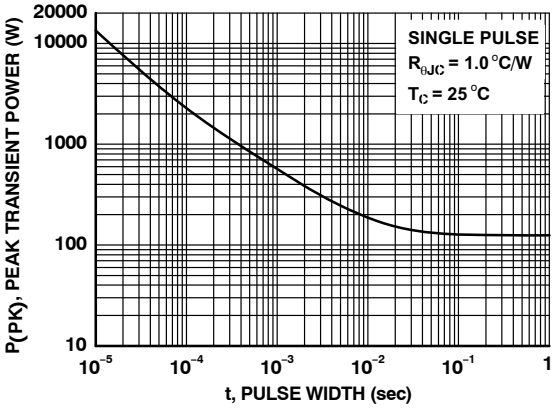



**Figure 12. Single Pulse Maximum Power Dissipation**

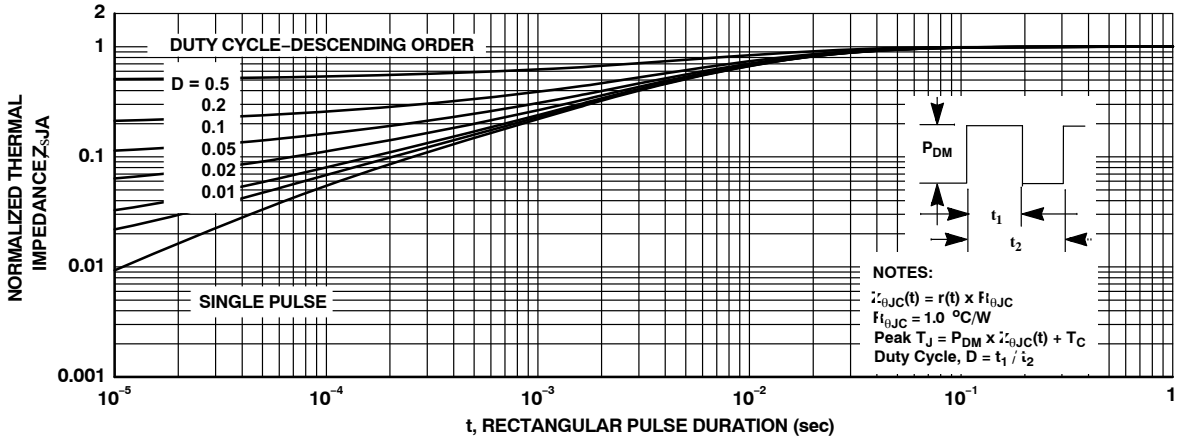
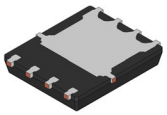


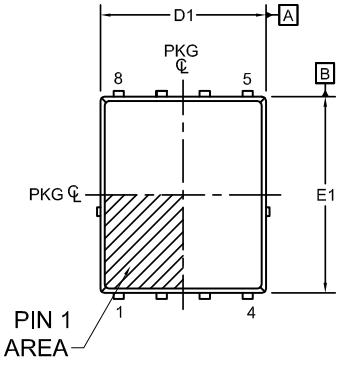

**Figure 13. Transient Thermal Response Curve**

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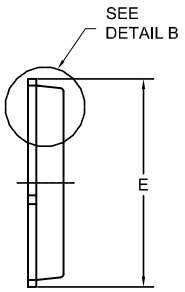


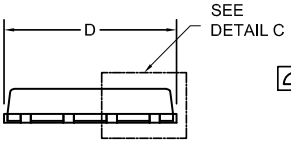
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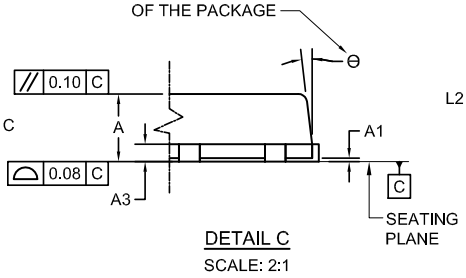



TOP VIEW

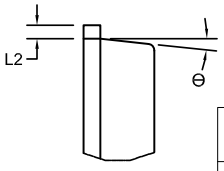



SIDE VIEW




DETAIL C
SCALE: 2:1

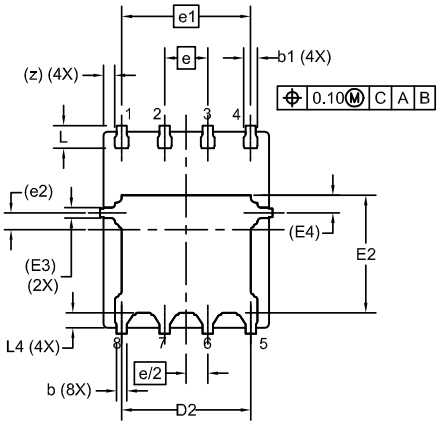



DETAIL B
SCALE: 2:1

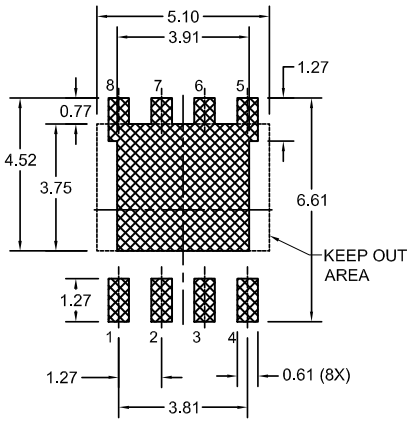
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
6. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.00 | - | 0.05 |
| b | 0.21 | 0.31 | 0.41 |
| b1 | 0.31 | 0.41 | 0.51 |
| A3 | 0.15 | 0.25 | 0.35 |
| D | 4.90 | 5.00 | 5.20 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 3.61 | 3.82 | 3.96 |
| E | 5.90 | 6.15 | 6.25 |
| E1 | 5.70 | 5.80 | 5.90 |
| E2 | 3.38 | 3.48 | 3.78 |
| E3 | 0.30 REF | | |
| E4 | 0.52 REF | | |
| e | 1.27 BSC | | |
| e/2 | 0.635 BSC | | |
| e1 | 3.81 BSC | | |
| e2 | 0.50 REF | | |
| L | 0.51 | 0.66 | 0.76 |
| L2 | 0.05 | 0.18 | 0.30 |
| L4 | 0.34 | 0.44 | 0.54 |
| z | 0.34 REF | | |
| Θ | 0° | - | 12° |




BOTTOM VIEW




LAND PATTERN
RECOMMENDATION

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| **DESCRIPTION:** | **PQFN8 5X6, 1.27P** | | **PAGE 1 OF 1** |

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**onsemi Website:** www.onsemi.com

**ONLINE SUPPORT**: www.onsemi.com/support
**For additional information, please contact your local Sales Representative at** www.onsemi.com/support/sales

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

# Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

### Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

**www.entegreci.com**

### Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

**Kategorilere göz atın**

### Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

**Üreticileri görün**

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

**Teklif isteyin**

**www.entegreci.com** | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

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