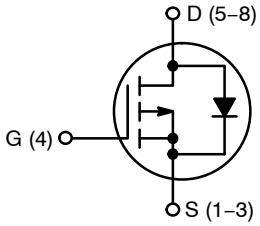
# MOSFET – P-Channel, POWERTRENCH®

## -20 V, -75 A, 4.9 mΩ

# FDMC6696P

| $V_{DS}$ | $R_{DS(ON)}$ MAX | $I_D$ MAX |
|---|---|---|
| −20 V | 4.9 mΩ @ −4.5 V | −75 A |
| | 6.5 mΩ @ −2.5 V | |
| | 16.4 mΩ @ −1.8 V | |




**P-Channel MOSFET**




**PQFN8**
**CASE 483AX**

### General Description

This P−Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process that has been optimized for $R_{DS(on)}$, switching performance and ruggedness.

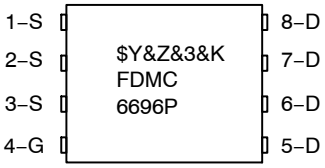
### Features

- Max $R_{DS(on)}$ = 4.9 mΩ at $V_{GS}$ = −4.5 V, $I_D$ = −18 A
- Max $R_{DS(on)}$ = 16.4 mΩ at $V_{GS}$ = −1.8 V, $I_D$ = −9 A
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability in a Widely Used Surface Mount Package
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Load Switch
- Battery Management
- Power Management
- Reverse Polarity Protection

### MARKING DIAGRAM




| | |
|---|---|
| $Y | = **onsemi** Logo |
| &Z | = Assembly Plant Code |
| &3 | = Data Code (Year & Week) |
| &K | = Lot |
| FDMC6696P | = Specific Device Code |

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

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain to Source Voltage | −20 | V |
| $V_{GS}$ | Gate to Source Voltage | ±12 | 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>−75<br>−47<br>−18<br>−335 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy (Note 3) | 54 | mJ |
| $P_D$ | Power Dissipation:<br>$T_C$ = 25°C<br>$T_A$ = 25°C (Note 1a) | <br>40<br>2.4 | 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.

### ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

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## THERMAL CHARACTERISTICS

| Symbol | Parameter | FDMC6696P | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 3.1 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 53 | |

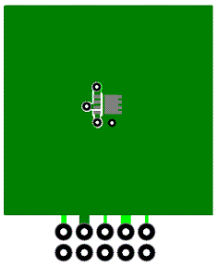
## ELECTRICAL CHARACTERISTICS ($T_J$ = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $I_D$ = −250 μA, $V_{GS}$ = 0 V | −20 | | | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = −250 μA, Referenced to 25 °C | | −15 | | mV/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = − 16 V, $V_{GS}$ = 0 V | | | −1 | μA |
| $I_{GSS}$ | Gate to Source Leakage Current | $V_{GS}$ = ± 12 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 | −0.4 | −0.7 | −1.6 | V |
| $\Delta V_{GS(th)}$ $\Delta T_J$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D$ = −250 μA, referenced to 25 °C | | 4 | | mV/°C |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS}$ = − 4.5 V, $I_D$ = −18 A | | 3.3 | 4.9 | mΩ |
| | | $V_{GS}$ = − 2.5 V, $I_D$ = −11 A | | 4.1 | 6.5 | |
| | | $V_{GS}$ = − 1.8 V, $I_D$ = −9 A | | 6.2 | 16.4 | |
| | | $V_{GS}$ = − 4.5 V, $I_D$ = −18 A, $T_J$ = 125 °C | | 4.5 | 6.8 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = −5 V, $I_D$ = −18 A | | 113 | | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = −10 V, $V_{GS}$ = 0 V, f = 1 MHz | | 7535 | 10550 | pF |
| $C_{oss}$ | Output Capacitance | | | 1100 | 1540 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 1040 | 1455 | pF |
| $R_g$ | Gate Resistance | | 0.1 | 4.5 | 10 | Ω |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = −10 V, $I_D$ = −18 A, $V_{GS}$ = −4.5 V, $R_G$ = 6 Ω | | 13 | 23 | ns |
| $t_r$ | Rise Time | | | 17 | 31 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 312 | 499 | ns |
| $t_f$ | Fall Time | | | 176 | 282 | ns |
| $Q_{g(TOT)}$ | Total Gate Charge | $V_{GS}$ = 0 V to −4.5 V, $V_{DD}$ = −10 V, $I_D$ = −18 A | | 78 | 109 | nC |
| | | $V_{GS}$ = 0 V to −2.5 V, $V_{DD}$ = −10 V, $I_D$ = −18 A | | 50 | 70 | nC |
| $Q_{gs}$ | Gate to Source Charge | $V_{DD}$ = −10 V, $I_D$ = −18 A | | 12 | | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | $V_{DD}$ = −10 V, $I_D$ = −18 A | | 24 | | nC |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | |
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = −18 A (Note 2) | | −0.7 | −1.2 | V |
| | | $V_{GS}$ = 0 V, $I_S$ = −2 A (Note 2) | | −0.6 | −1.2 | |
| $t_{rr}$ | Reverse Recovery Time | $I_S$ = −18 A, di/dt = 100 A/μs | | 41 | 66 | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 22 | 35 | nC |

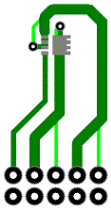
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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 x 1.5 in. board of FR−4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 53 °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 54 mJ is based on starting $T_J$ = 25 C, L = 3 mH, $I_{AS}$ = −6 A, $V_{DD}$ = − 20 V, $V_{GS}$ = −10 V.
4. Pulsed Id please refer to Fig 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.

## PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| FDMC6696P | FDMC6696P | PQFN8<br>(Pb Free) | 13” | 12 mm | 3000 Units |

## TYPICAL CHARACTERISTICS

($T_J$ = 25 °C unless otherwise noted)

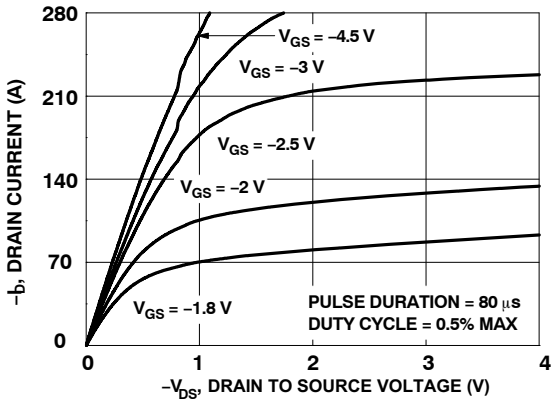



**Figure 1. On−Region Characteristics**

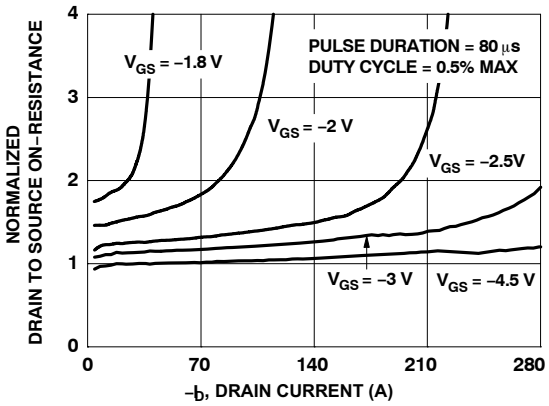



**Figure 2. Normalized On−Resistance vs. Drain Currentand Gate Voltage**

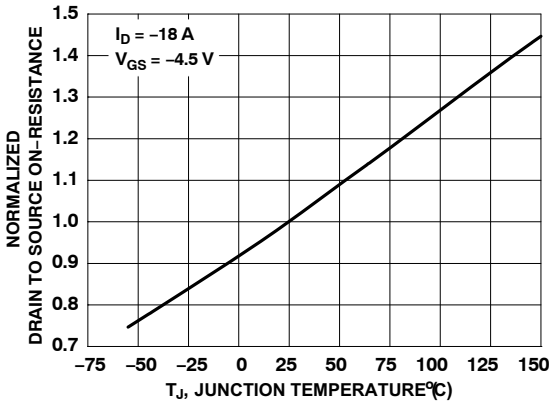



**Figure 3. Normalized On−Resistance vs Junction Temperature**

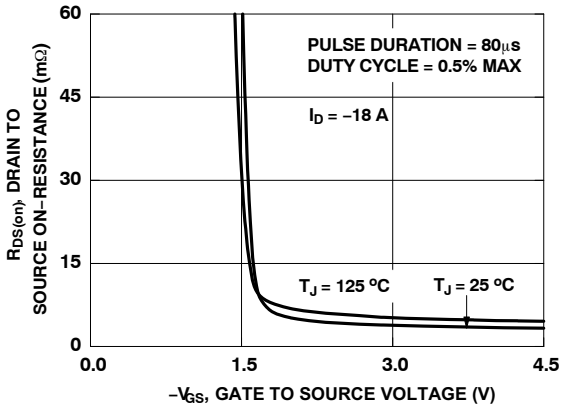



**Figure 4. On−Resistance vs Gate to Source Voltage**

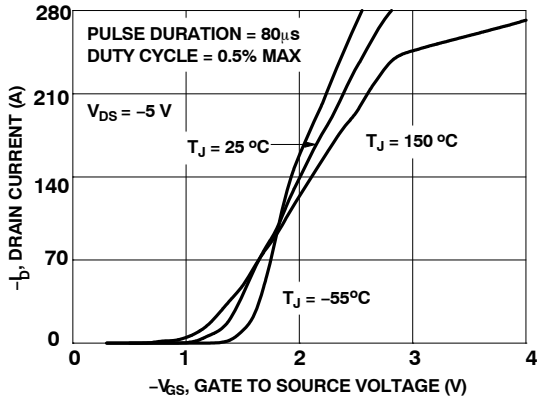



**Figure 5. Transfer Characteristics**

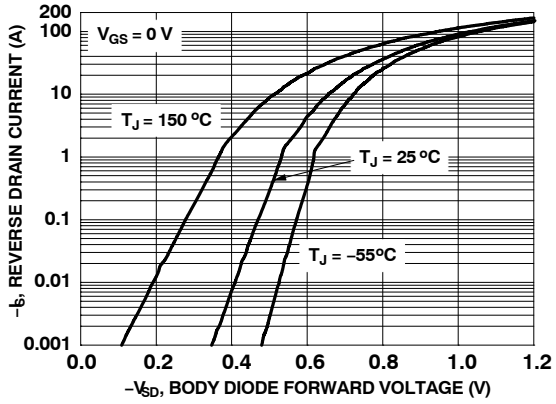



**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

## TYPICAL CHARACTERISTICS

($T_J$ = 25 °C unless otherwise noted)

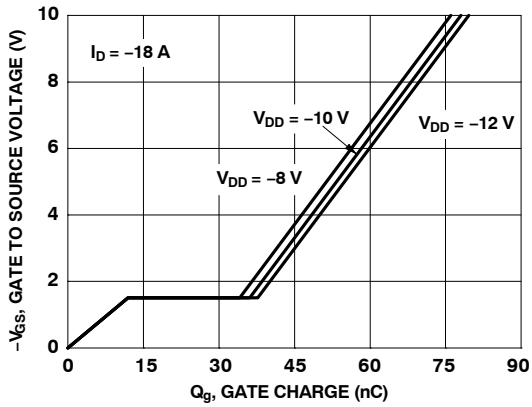



**Figure 7. Gate Charge Characteristics**

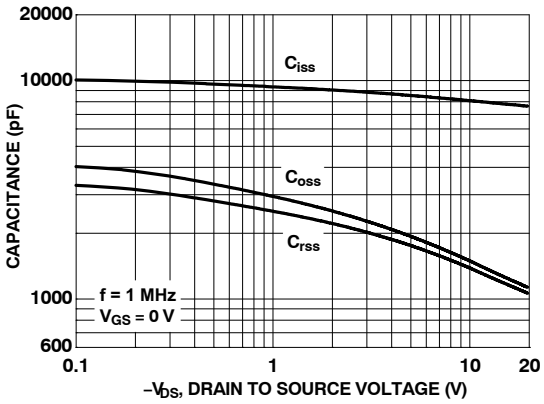



**Figure 8. Capacitance vs Drain to Source Voltage**

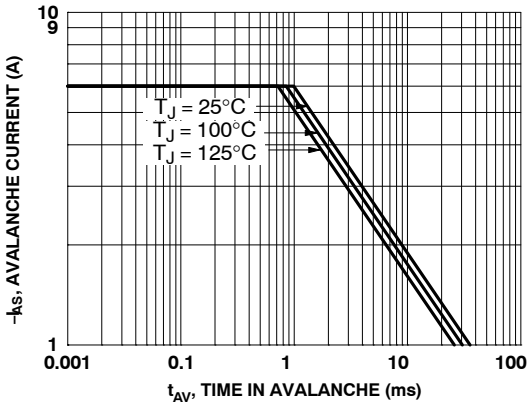



**Figure 9. Unclamped Inductive Switching Capability**

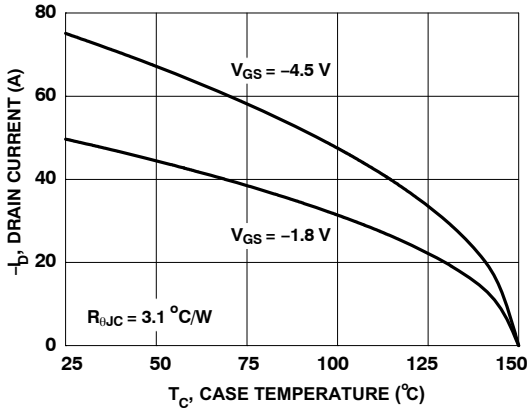



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

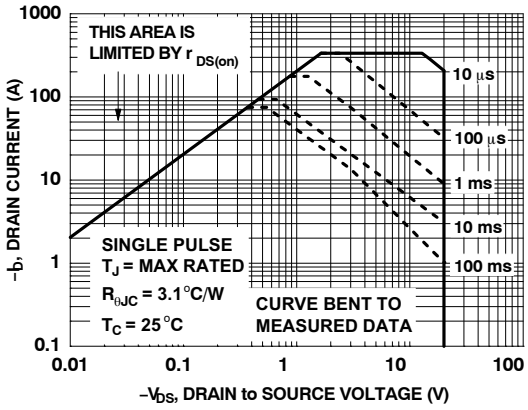



**Figure 11. Forward Bias Safe Operating Area**

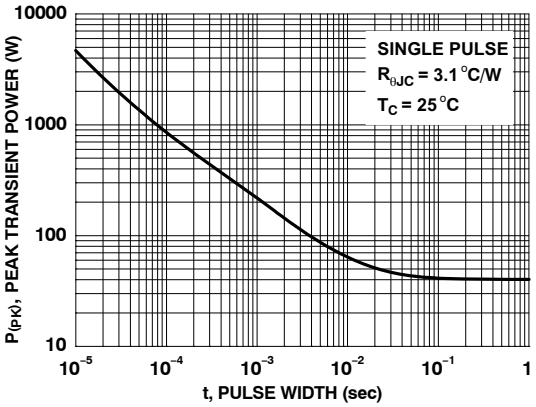



**Figure 12. Single Pulse Maximum Power Dissipation**

## TYPICAL CHARACTERISTICS

($T_J$ = 25 °C unless otherwise noted)

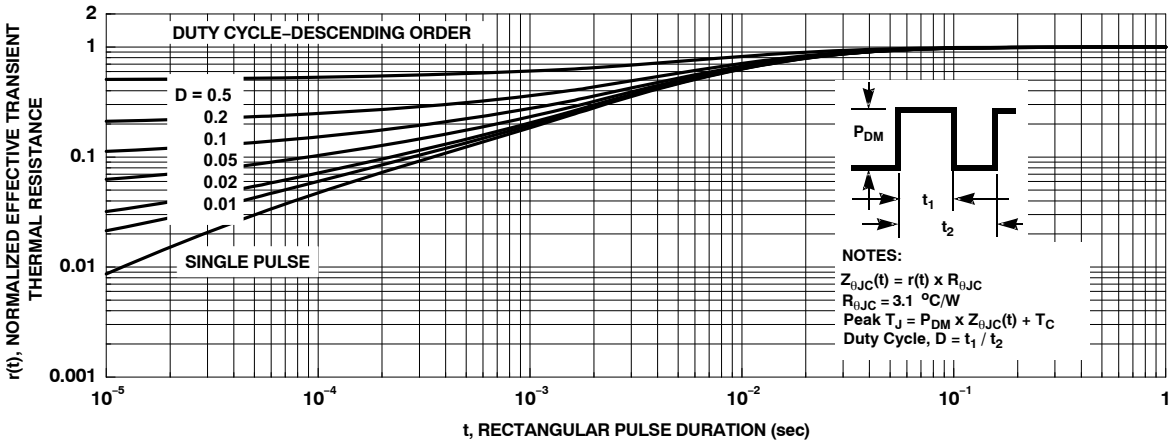



**Figure 13. Junction−to−Case Transient Thermal Response Curve**

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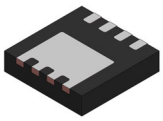

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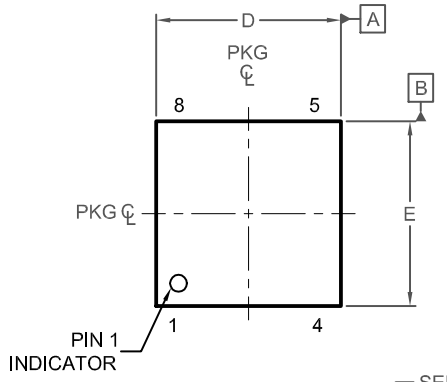
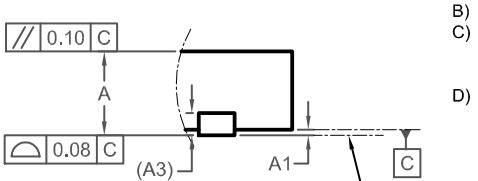
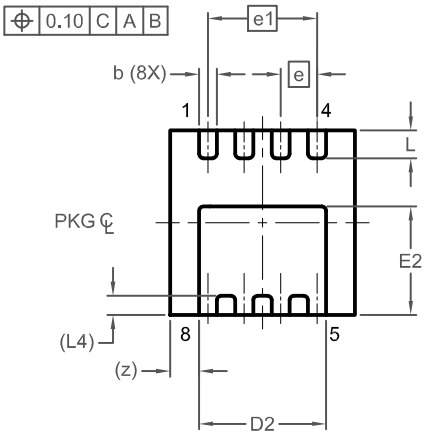
CASE 483AX
ISSUE B

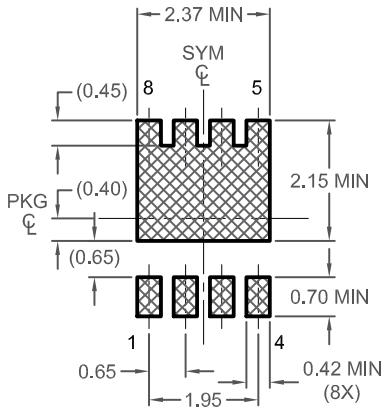
DATE 24 JUN 2022




DETAIL A
SCALE: 2X




LAND PATTERN
RECOMMENDATION

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NOTES: UNLESS OTHERWISE SPECIFIED

A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. BA,
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | - | 0.05 |
| A3 | 0.20 REF | | |
| b | 0.27 | 0.32 | 0.37 |
| D | 3.20 | 3.30 | 3.40 |
| D2 | 2.17 | 2.27 | 2.37 |
| E | 3.20 | 3.30 | 3.40 |
| E2 | 1.84 | 1.94 | 2.04 |
| e | 0.65 BSC | | |
| e1 | 1.95 BSC | | |
| L | 0.40 | 0.50 | 0.60 |
| L4 | 0.34 REF | | |
| z | 0.52 REF | | |

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|---|---|---|
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| **DESCRIPTION:** | **PQFN8 3.3X3.3, 0.65P** | **PAGE 1 OF 1** |

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Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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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**

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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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