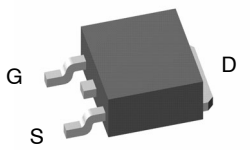
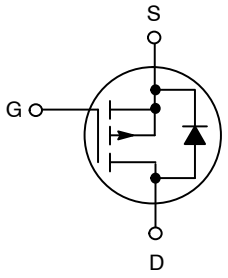
MOSFET – P-Channel, POWERTRENCH®

30 V

FDD6685



DPAK3 (TO−252 3 LD)
CASE 369AS



General Description

This P−Channel MOSFET is a rugged gate version of **onsemi**'s advanced POWERTRENCH process. It has been optimized for power management applications requiring a wide range of gave drive voltage ratings (4.5 V – 2 5 V).

Features

- −40 A, −30 V
  - $R_{DS(ON)}$ = 20 mΩ @ V_{GS} = −10 V
  - $R_{DS(ON)}$ = 30 mΩ @ V_{GS} = −4.5 V
- Fast Switching Speed
- High Performance Trench Technology for Extremely Low $R_{DS(ON)}$
- High Power and Current Handling Capability
- Qualified to AEC−Q101
- This Device is Pb−Free and are RoHS Compliant

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, Unless otherwise noted)

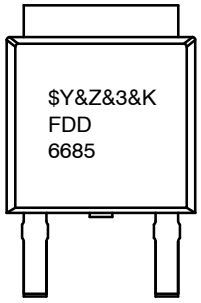
Symbol	Parameter		Ratings	Units
V_{DSS}	Drain−Source Voltage		−30	V
V_{GSS}	Gate−Source Voltage		±25	V
I_D	Continuous Drain Current	@T_C = 25°C (Note 5)	−40	A
		@T_A = 25°C (Note 3a)	−11	
		Pulsed, PW ≤ 100 μs (Note 3b)	−100	
P_D	Power Dissipation for Single Operation	(Note 3)	52	W
		(Note 3a)	3.8	
		(Note 3b)	1.6	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		−55 to +175	°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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case (Note 3)	2.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 3a)	40	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 3b)	96	°C/W

MARKING DIAGRAM



$Y	= **onsemi** Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FDD6685	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

© Semiconductor Components Industries, LLC, 2011

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
DRAIN–SOURCE AVALANCHE RATINGS (NOTE 4)						
E_{AS}	Single Pulse Drain–Source Avalanche Energy	I_D = –11 A	–	42	–	mJ
I_{AS}	Maximum Drain–Source Avalanche Current		–	–11	–	A
OFF CHARACTERISTICS						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = –250 μA	–30	–	–	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = –250 μA, Referenced to 25°C	–	–24	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –24 V, V_{GS} = 0 V	–	–	–1	μA
I_{GSS}	Gate–Body Leakage	V_{GS} = ±25V, V_{DS} = 0 V	–	–	±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 μA	–1	–1.8	–3	V
$\Delta V_{GS(th)}$ / ΔT_J	Gate Threshold Voltage Temperature Coefficient	I_D = –250 μA, Referenced to 25°C	–	5	–	mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = –10 V, I_D = –11 A V_{GS} = –4.5 V, I_D = –9 A V_{GS} = –10 V, I_D = –11 A, T_J = 125°C	–	14 21 20	20 30	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = –10 V, V_{DS} = –5 V	–20	–	–	A
g_{FS}	Forward Transconductance	V_{DS} = –5 V, I_D = –11 A	–	26	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = –15 V, V_{GS} = 0 V, f = 1.0 MHz	–	1715	–	pF
C_{oss}	Output Capacitance		–	440	–	pF
C_{rss}	Reverse Transfer Capacitance			225	–	pF
R_G	Gate Resistance	V_{GS} = 15 mV, f = 1.0 MHz	–	3.6	–	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = –15 V, I_D = –1 A, V_{GS} = –10 V, R_{GEN} = 6 Ω	–	17	31	ns
t_r	Turn–On Rise Time		–	11	21	ns
$t_{d(off)}$	Turn–Off Delay Time			43	68	ns
t_f	Turn–Off Fall Time		–	21	34	ns
Q_g	Total Gate Charge	V_{DS} = –15V, I_D = –11 A, V_{GS} = –5 V	–	17	24	nC
Q_{gs}	Gate–Source Charge		–	9	–	nC
Q_{gd}	Gate–Drain Charge			4	–	nC
DRAIN–SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = –3.2 A (Note 4)	–	–0.8	–1.2	V
T_{rr}	Diode Reverse Recovery Time	I_F = –11 A, dI_F/dt = 100 A/μs	–	26	–	ns
Q_{rr}	Diode Reverse Recovery Charge		–	13	–	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.

Share Feedback
Your Opinion Matters

NOTES:

1. This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry.
2. All **onsemi** products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.
3. $R_{\theta JA}$ is the sum of the junction−to−case and case−to−ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) $R_{\theta JA}$ = 40°C/W when mounted on 1in^2 pad of 2 oz copper



b) $R_{\theta JA}$ = 96°C/W when mounted on a minimum pad

4. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%
5. Maximum current is calculated as: $\sqrt{\frac{P_D}{R_{DS(ON)}}}$ where P_D is maximum power dissipation at T_C = 25°C and $R_{DS(on)}$ is at $T_{J(max)}$ and V_{GS} = 10 V.
6. Starting T_J = 25°C, L = 0.69 mH, I_{AS} = −11 A

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS

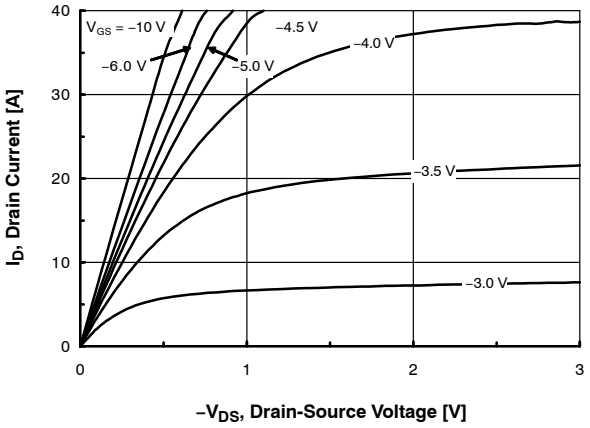


Figure 1. On-Region Characteristics

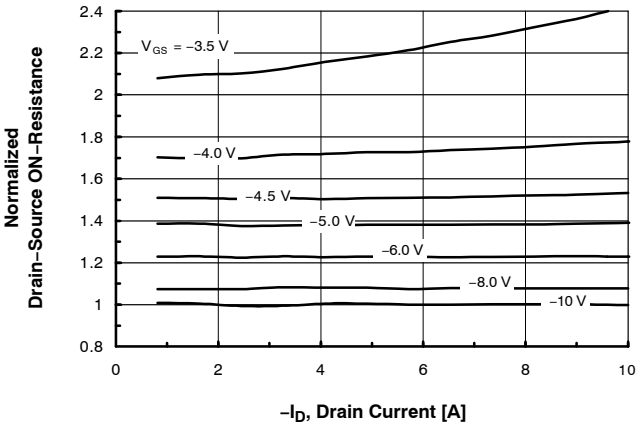


Figure 2. On−Resistance Variation with Drain Current and Gate Voltage

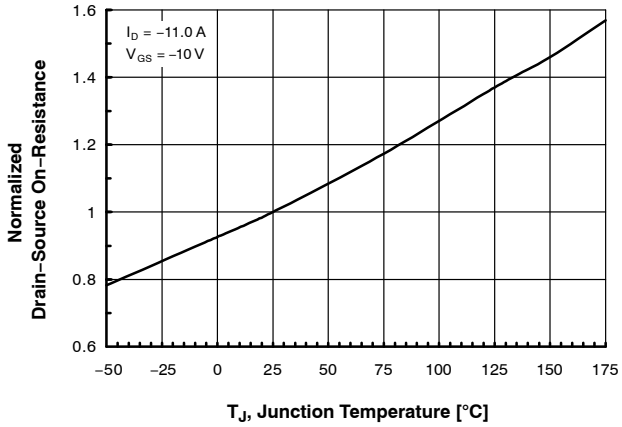


Figure 3. On-Resistance Variation with Temperature

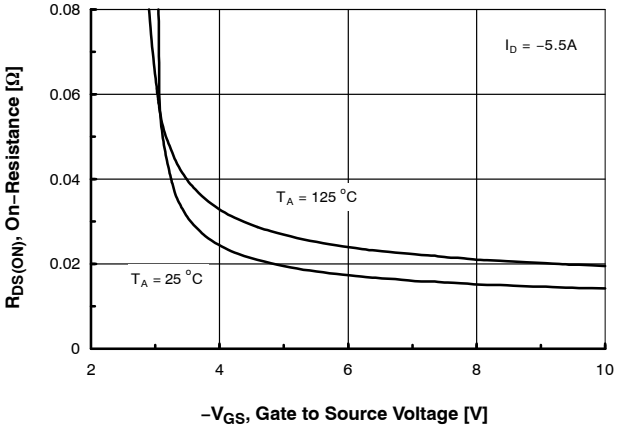


Figure 4. On−Resistance Variation with Gate−to−Source Voltage

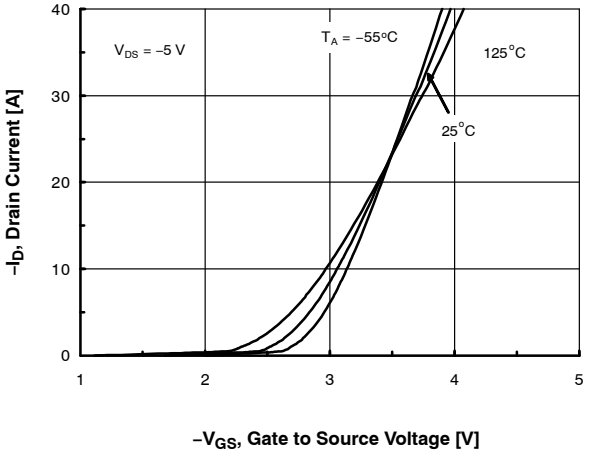


Figure 5. Transfer Characersistics

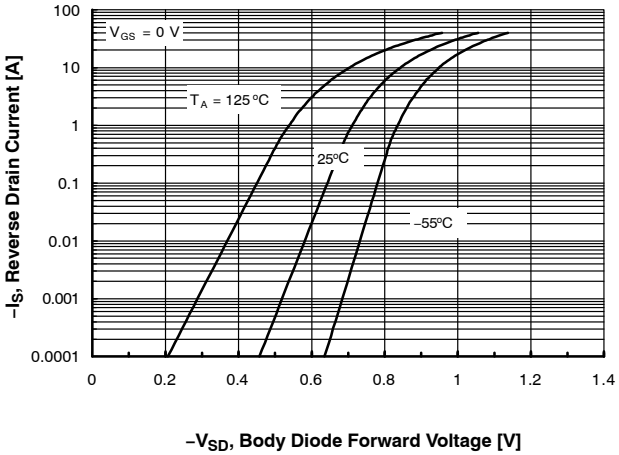


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS (continued)

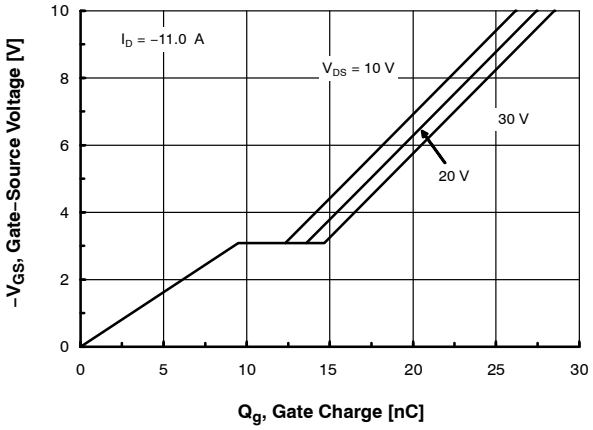


Figure 7. Gate Charge Characteristics

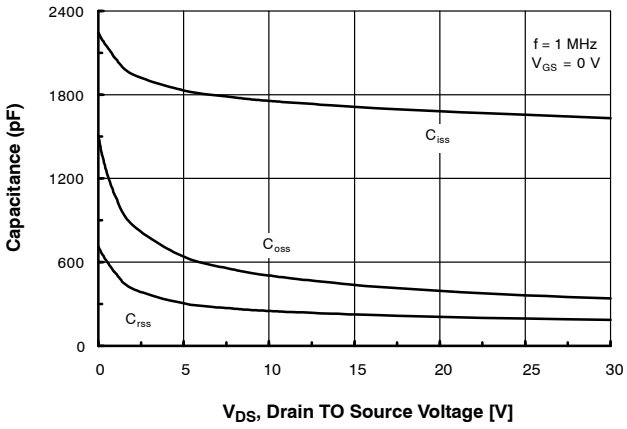


Figure 8. Capacitance Characteristics

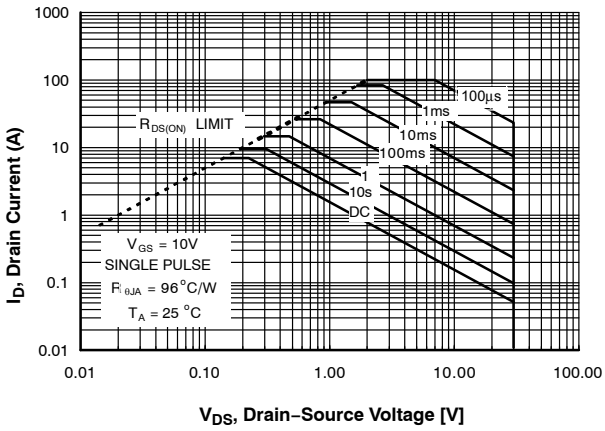


Figure 9. Maximum Safe Operating Area

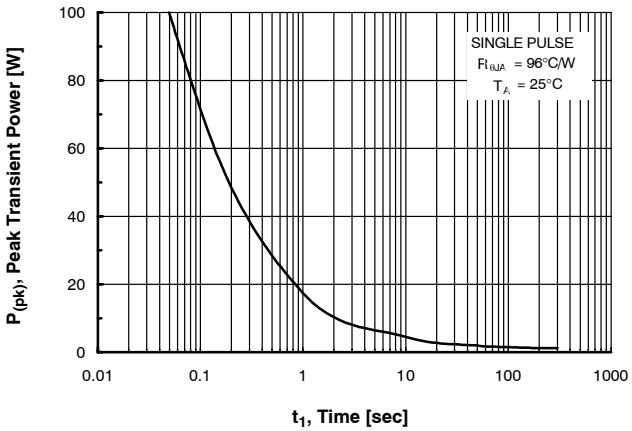


Figure 10. Single Pulse Minimum Power Dissipation

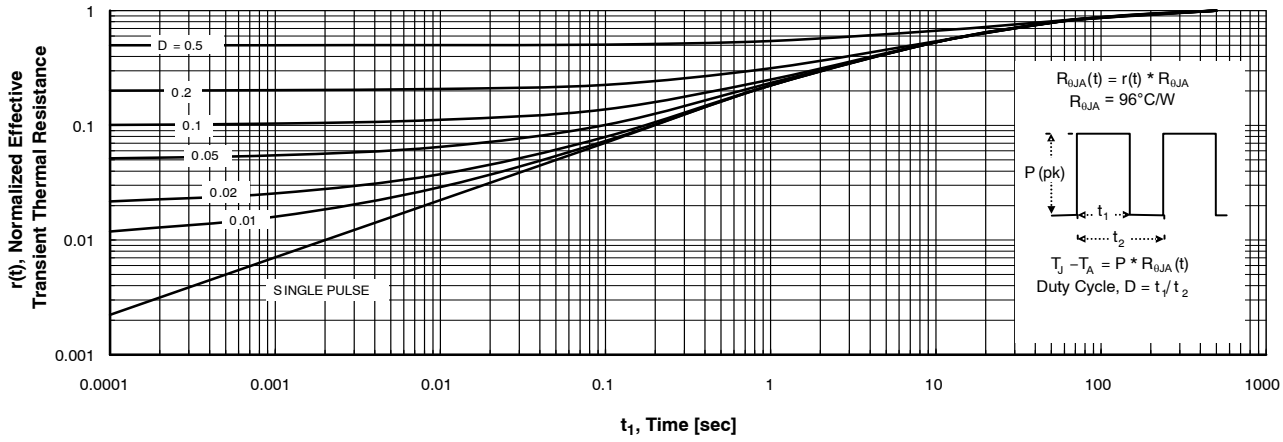


Figure 11. Transient Thermal Response Curve

NOTES:
7. Thermal characterization performed using the conditions described in Note 3b.
8. Transient thermal response will change depending on the circuit board design.

Share Feedback
Your Opinion Matters

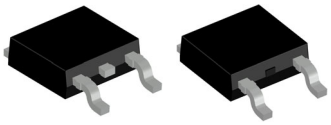
PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Device	Reel Size	Tape Width	Shipping†
FDD6685	FDD6685	13”	16 mm	2,500 Tape & Reels

†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.

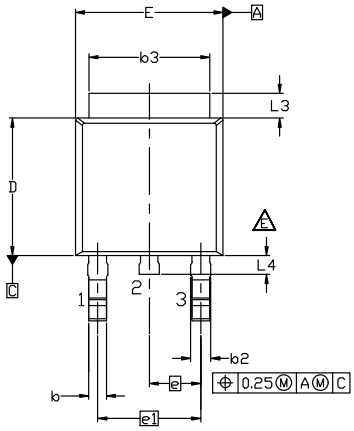
POWERTRENCH is registered trademark of Semiconductor Components Industries, LLC dba **“onsemi”** or its affiliates and/or subsidiaries in the United States and/or other countries.

Share Feedback
Your Opinion Matters

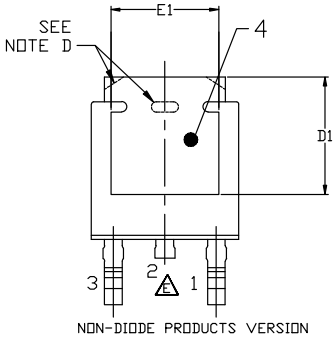


DPAK3 6.10x6.54x2.29, 4.57P
CASE 369AS
ISSUE B

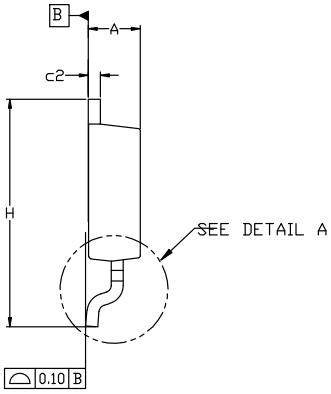
DATE 20 DEC 2023



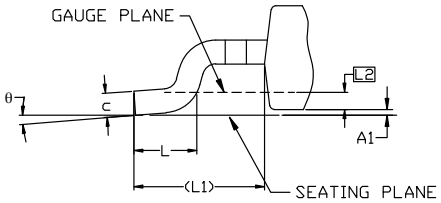
NON-DIODE PRODUCTS VERSION



NON-DIODE PRODUCTS VERSION

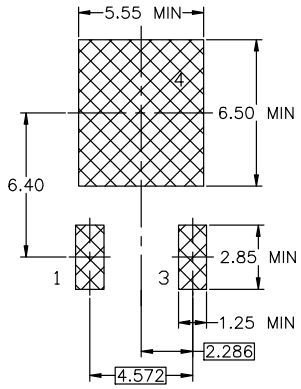


NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE F, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.
F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.



DETAIL A
(ROTATED -90°)
SCALE: 12X

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.29	2.39
A1	0.00	–	0.127
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	5.21	5.34	5.46
c	0.45	0.53	0.61
c2	0.45	0.52	0.58
D	5.97	6.10	6.22
D1	5.21	---	---
E	6.35	6.54	6.73
E1	4.32	---	---
e	2.286 BSC		
e1	4.572 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.90 REF		
L2	0.51 BSC		
L3	0.89	1.08	1.27
L4	---	---	1.02
θ	0°	---	10°



LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

DOCUMENT NUMBER:	**98AON13810G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**DPAK3 6.10x6.54x2.29, 4.57P**	**PAGE 1 OF 1**

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
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.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.