

MOSFET - POWERTRENCH[®], N-Channel

80 V, 110 A, 2.4 mΩ

FDB86363-F085

Features

- Typical $R_{DS(on)} = 2.0\text{ m}\Omega$ at $V_{GS} = 10\text{ V}$, $I_D = 80\text{ A}$
- Typical $Q_{g(tot)} = 131\text{ nC}$ at $V_{GS} = 10\text{ V}$, $I_D = 80\text{ A}$
- UIS Capability
- AEC-Q101 Qualified and PPAP Capable
- This Device is Pb-Free, Halide Free and is RoHS Compliant

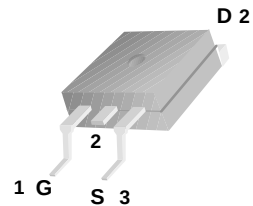
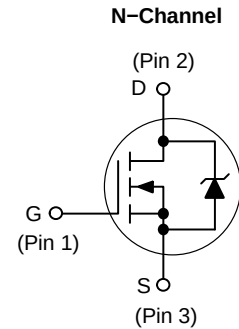
Applications

- Automotive Engine Control
- Power Train Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12 V Systems



ON Semiconductor[®]

www.onsemi.com



D²PAK-3 (TO-263, 3-LEAD)
CASE 418AJ

PIN CONFIGURATION

Position	Designation
Pin 1	Gate
Pin 2 / Tab	Drain
Pin 3	Source

MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FDB86363	= Specific Device Code

ORDERING INFORMATION

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

FDB86363–F085

MOSFET MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$, Unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-to-Source Voltage	80	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Drain Current –Continuous ($V_{GS} = 10\text{ V}$) (Note 1) $T_C = 25^\circ\text{C}$	110	A
	–Pulsed $T_C = 25^\circ\text{C}$	See Figure 4	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	512	mJ
P_D	Power Dissipation	300	W
	Derate Above 25°C	2.0	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature	-55 to $+175$	$^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient (Note 3)	43	$^\circ\text{C/W}$

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.

1. Current is limited by bondwire configuration.
2. Starting $T_J = 25^\circ\text{C}$, $L = 0.25\text{ mH}$, $I_{AS} = 64\text{ A}$, $V_{DD} = 80\text{ V}$ during inductor charging and $V_{DD} = 0\text{ V}$ during time in avalanche.
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 $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in^2 pad of 2 oz copper.

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Shipping [†]
FDB86363	FDB86363–F085	D2PAK (TO–263) (Pb–Free/Halide Free)	800 units / 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

FDB86363–F085

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
--------	-----------	-----------------	------	------	------	-------

OFF CHARACTERISTICS

B _{VDS}	Drain-to-Source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0 V	80			V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} = 80 V, V _{GS} = 0 V, T _J = 25°C			1	μA
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 175°C (Note 4)			1	mA
I _{GSS}	Gate-to-Source Leakage Current	V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS

V _{GS(th)}	Gate to Source Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μA	2.0	3.0	4.0	V
R _{DS(on)}	Drain-to-Source On-Resistance	I _D = 80 A, V _{GS} = 10 V, T _J = 25°C		2.0	2.4	mΩ
		I _D = 80 A, V _{GS} = 10 V, T _J = 175°C (Note 4)		3.8	4.3	

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = 40 V, V _{GS} = 0 V, f = 1 MHz			10000		pF
C _{oss}	Output Capacitance				1400		pF
C _{rss}	Reverse Transfer Capacitance				95		pF
R _g	Gate Resistance	f = 1 MHz			3.3		Ω
Q _{g(TOT)}	Total Gate Charge	V _{GS} = 0 V to 10 V	V _{DD} = 64 V, I _D = 80 A		131	150	nC
Q _{g(th)}	Threshold Gate Charge	V _{GS} = 0 V to 2 V			18	21	nC
Q _{gs}	Gate-to-Source Gate Charge				47		nC
Q _{gd}	Gate-to-Drain "Miller" Charge				24		nC

SWITCHING CHARACTERISTICS

t _{on}	Turn-On Time	V _{DD} = 40 V, I _D = 80 A, V _{GS} = 10V, R _{GEN} = 6 Ω			231	ns
t _{d(on)}	Turn-On Delay			38		ns
t _r	Rise Time			129		ns
t _{d(off)}	Turn-Off Delay			64		ns
t _f	Fall Time			40		ns
t _{off}	Turn-Off Time				135	ns

DRAIN-SOURCE DIODE CHARACTERISTICS

V _{SD}	Source-to-Drain Diode Voltage	V _{GS} = 0 V, I _{SD} = 80 A V _{GS} = 0 V, I _{SD} = 40 A			1.25 1.2	V
t _{rr}	Reverse-Recovery Time	I _F = 80 A, ΔI _{SD} /Δt = 100 A/μs, V _{DD} = 64 V		88	101	ns
Q _{rr}	Reverse-Recovery Charge			129	157	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.

4. The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

TYPICAL CHARACTERISTICS

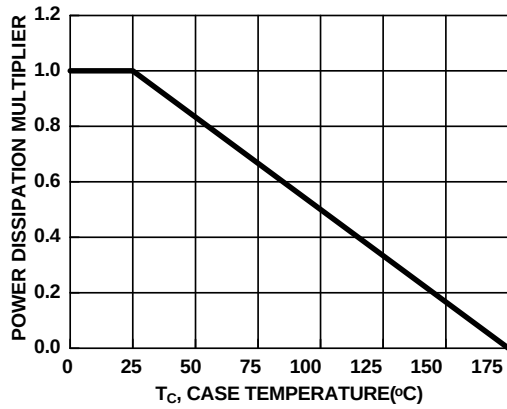


Figure 1. Normalized Power Dissipation vs. Case Temperature

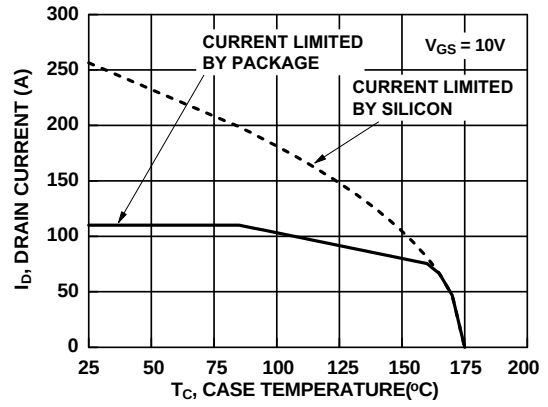


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

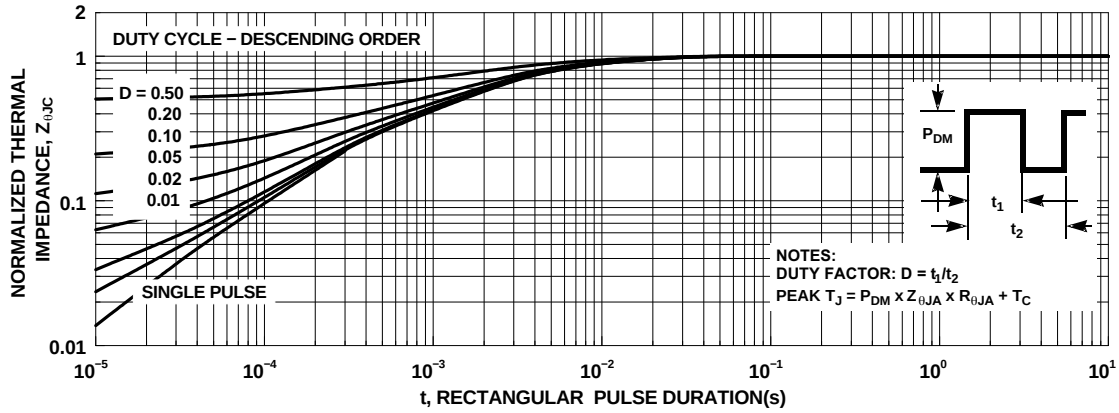


Figure 3. Normalized Maximum Transient Thermal Impedance

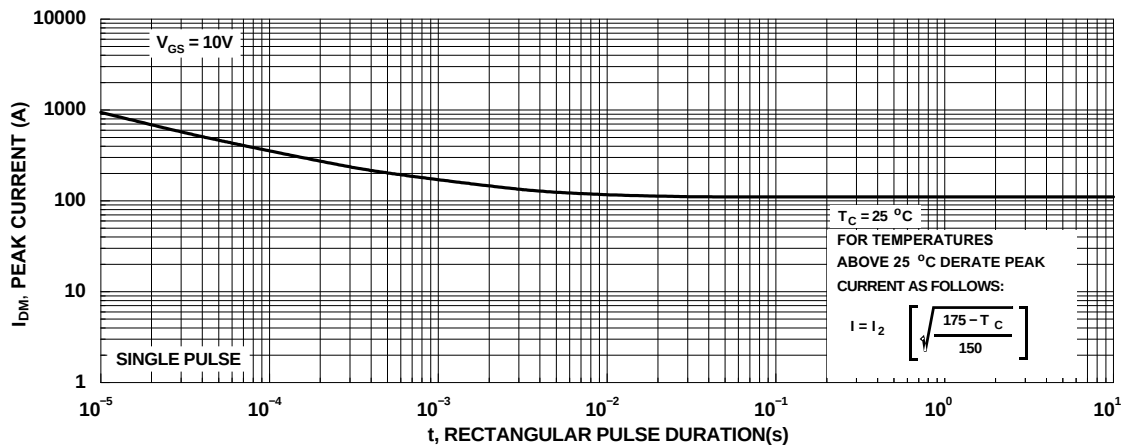


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS

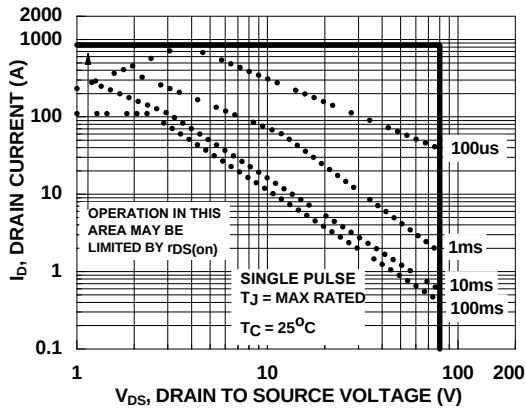
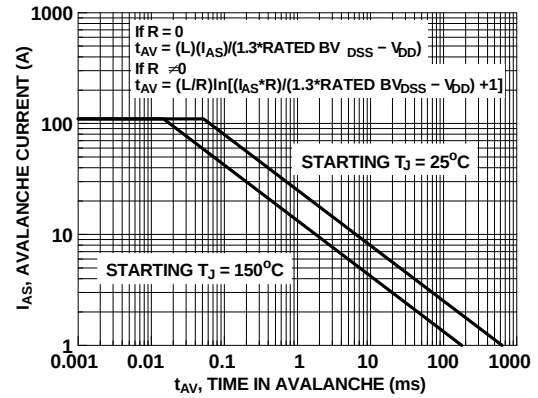


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

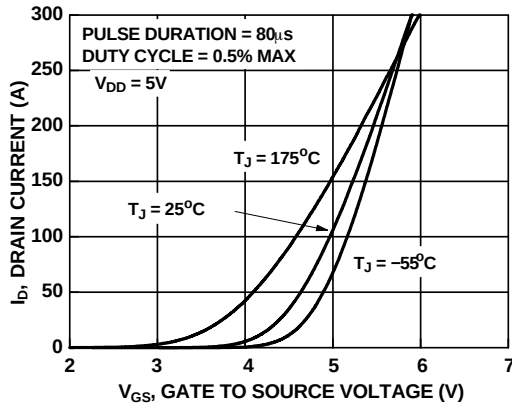


Figure 7. Transfer Characteristics

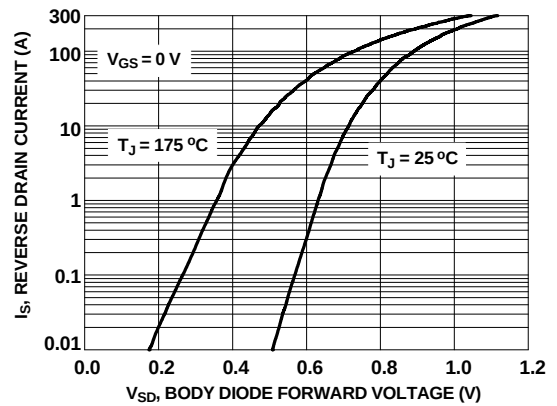


Figure 8. Forward Diode Characteristics

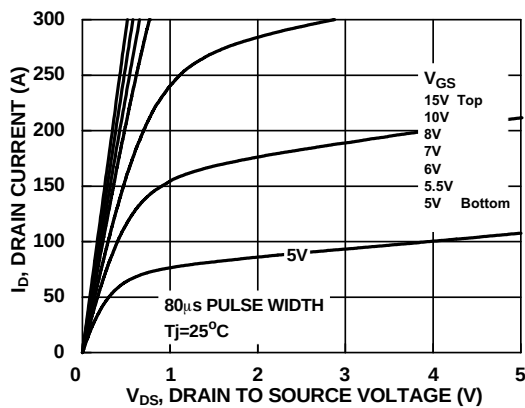


Figure 9. Saturation Characteristics

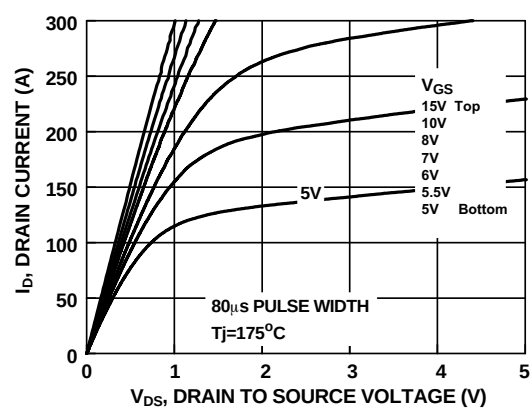


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS

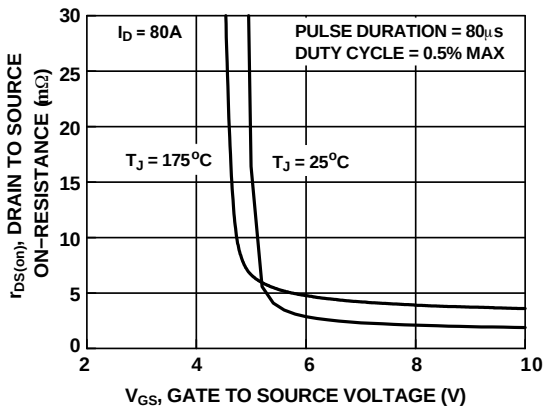
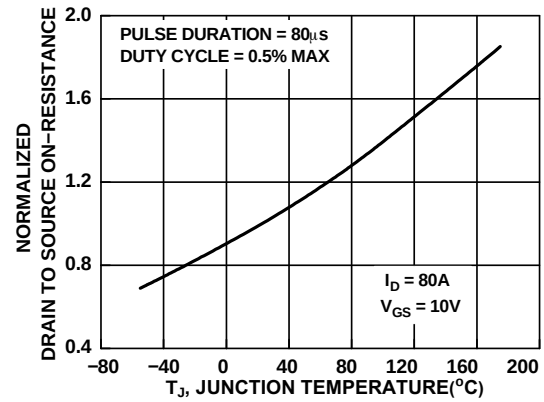
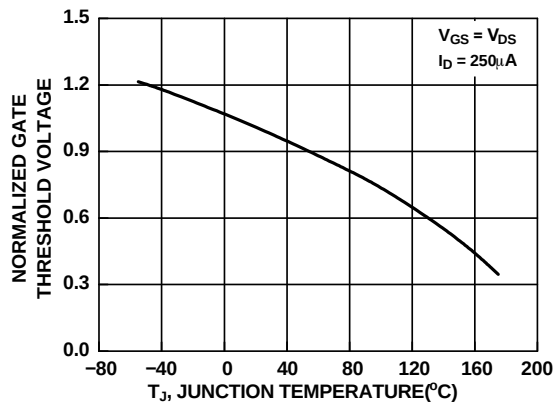
Figure 11. $R_{DS(on)}$ vs. Gate VoltageFigure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

Figure 13. Normalized Gate Threshold Voltage vs. Temperature

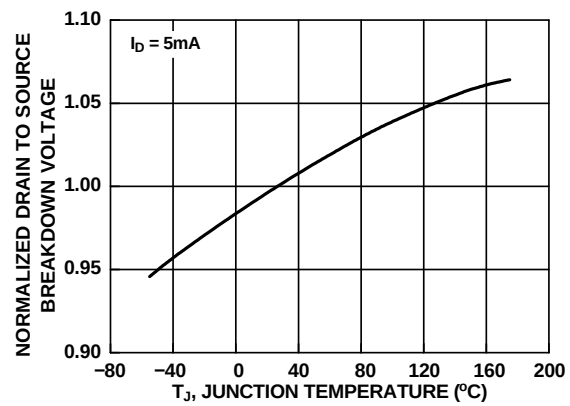


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

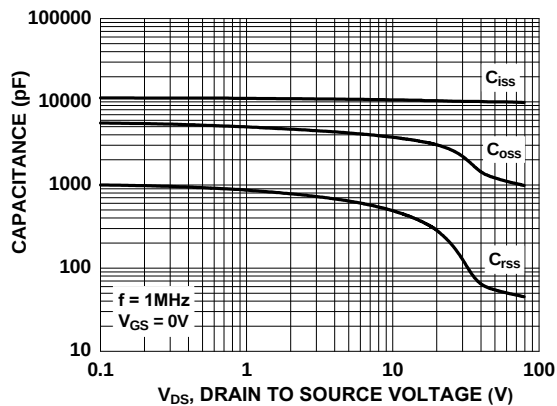


Figure 15. Capacitance vs. Drain to Source Voltage

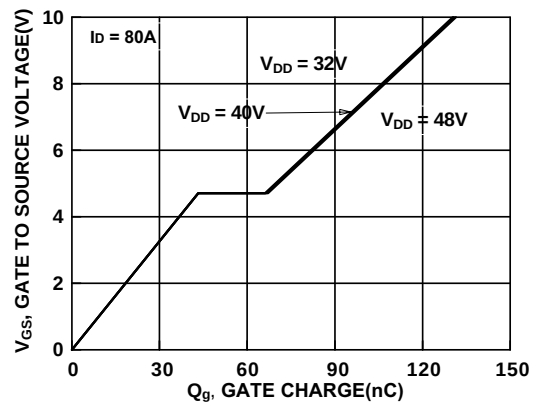
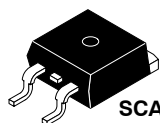


Figure 16. Gate Charge vs. Gate to Source Voltage

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



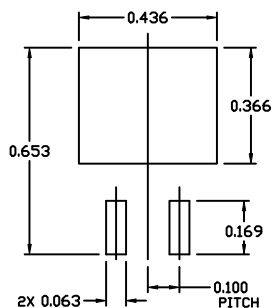
SCALE 1:1

D²PAK-3 (TO-263, 3-LEAD)

CASE 418AJ

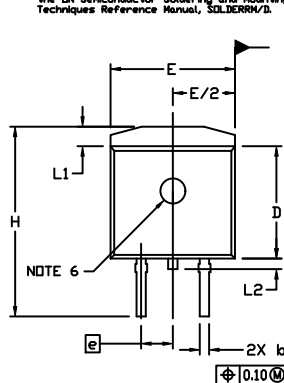
ISSUE F

DATE 11 MAR 2021



RECOMMENDED MOUNTING FOOTPRINT

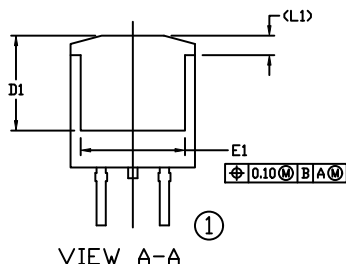
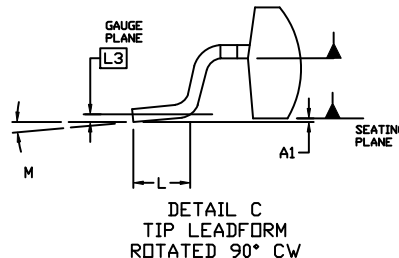
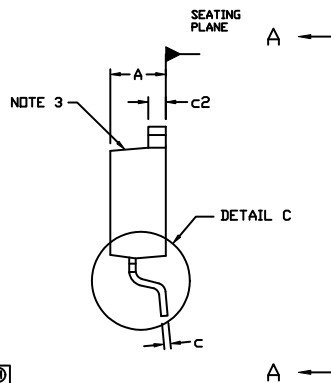
■ For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



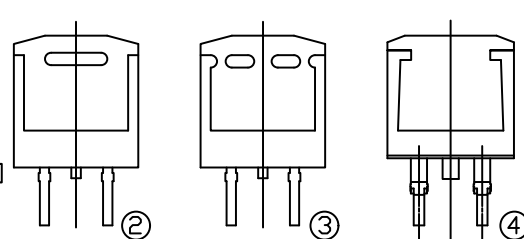
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. CHAMFER OPTIONAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005 PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
5. THERMAL PAD CONTOUR IS OPTIONAL WITHIN DIMENSIONS E, L1, D1, AND E1.
6. OPTIONAL MOLD FEATURE.
7. ①, ② ... OPTIONAL CONSTRUCTION FEATURE CALL OUTS.

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.160	0.190	4.06	4.83
A1	0.000	0.010	0.00	0.25
b	0.020	0.039	0.51	0.99
c	0.012	0.029	0.30	0.74
c2	0.045	0.065	1.14	1.65
D	0.330	0.380	8.38	9.65
D1	0.260	---	6.60	---
E	0.380	0.420	9.65	10.67
E1	0.245	---	6.22	---
e	0.100	BSC	2.54	BSC
H	0.575	0.625	14.60	15.88
L	0.070	0.110	1.78	2.79
L1	---	0.066	---	1.68
L2	---	0.070	---	1.78
L3	0.010	BSC	0.25	BSC
M	0°	8°	0°	8°

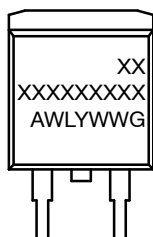


VIEW A-A

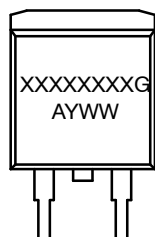


VIEW A-A
OPTIONAL CONSTRUCTIONS

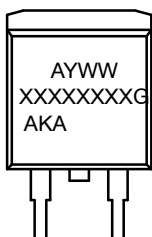
GENERIC MARKING DIAGRAMS*



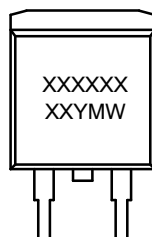
IC



Standard



Rectifier



SSG

XXXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
W = Week Code (SSG)
M = Month Code (SSG)
G = Pb-Free Package
AKA = Polarity Indicator

*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.

DOCUMENT NUMBER:	98AON56370E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D ² PAK-3 (TO-263, 3-LEAD)	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative