FDT86106LZ Datasheet

https://www.DiGi-Electronics.com

DiGi Electronics Part Number	FDT86106LZ-DG
Manufacturer	onsemi
Manufacturer Product Number	FDT86106LZ
Description	MOSFET N-CH 100V 3.2A SOT223-4
Detailed Description	N-Channel 100 V 3.2A (Ta) 2.2W (Ta) Surface Mount SOT-223-4

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FDT86106LZ	onsemi
Series:	Product Status:
PowerTrench®	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
100 V	3.2A (Ta)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
4.5V, 10V	108mOhm @ 3.2A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
2.2V @ 250µA	7 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	315 pF @ 50 V
FET Feature:	Power Dissipation (Max):
-	2.2W (Ta)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
SOT-223-4	TO-261-4, TO-261AA
Base Product Number:	
FDT86106	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

DATA SHEET
www.onsemi.com

MOSFET – N-Channel, POWERTRENCH®

100 V, 3.2 A, 108 mΩ

FDT86106LZ

V_{DSS}	$R_{DS(ON)}$ MAX	I_D MAX
100 V	108 mΩ @ 10 V	3.2 A
	153 mΩ @ 4.5 V	

General Description

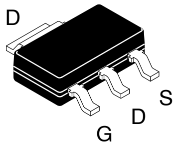
This N−Channel logic Level MOSFETs are produced using **onsemi**'s advanced POWERTRENCH process that has been special tailored to minimize the on−state resistance and yet maintain superior switching performance. G−S zener has been added to enhance ESD voltage level.

Features

- Max $r_{DS(on)}$ = 108 mΩ at V_{GS} = 10 V, I_D = 3.2 A
- Max $r_{DS(on)}$ = 153 mΩ at V_{GS} = 4.5 V, I_D = 2.7 A
- High Performance Trench Technology for Extremely Low $r_{DS(on)}$
- High Power and Current Handling Capability in a Widely Used Surface Mount Package
- HBM ESD Protection Level > 3 kV Typical (Note 4)
- 100% UIL Tested
- This Device is Pb−Free, Halide Free and is RoHS Compliant

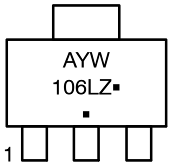
Applications

- DC – DC Conversion



SOT−223
CASE 318H

MARKING DIAGRAM



A = Specific Device Code
Y = Date Code
W = Work Week
106LZ = Specific Device Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

MOSFET MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

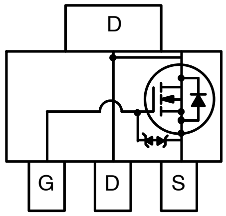
Symbol	Parameter		Ratings	Unit
V_{DS}	Drain−Source Voltage		100	V
V_{GS}	Gate−Source Voltage		±20	V
I_D	Drain Current	– Continuous T_A = 25°C (Note 1a.)	3.2	A
		– Pulsed	12	
E_{AS}	Single Pulse Avalanche Energy (Note 3)		12	mJ
P_D	Power Dissipation	T_A = 25°C (Note 1a.)	2.2	W
		T_A = 25°C (Note 1b.)	1.0	
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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	12	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a.)	55	°C/W

PINOUT



ORDERING INFORMATION

Device	Package	Shipping†
FDT86106LZ	106LZ	4000 / Tape & Reel

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

July, 2022 − Rev. 3

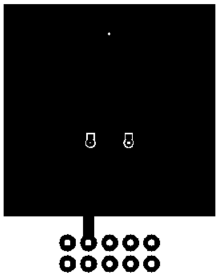
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	100	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	71	–	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	V_{GS} = ±20 V, V_{DS} = 0 V	–	–	±10	μA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1.0	1.5	2.2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	–5	–	mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 3.2 A V_{GS} = 4.5 V, I_D = 2.7 A, V_{GS} = 10 V, I_D = 3.2 A, T_J = 125°C	– – –	80 100 140	108 153 189	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 3.2 A	–	8	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz	–	234	315	pF
C_{oss}	Output Capacitance		–	46	65	pF
C_{rss}	Reverse Transfer Capacitance		–	3.1	5	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 50 V, I_D = 3.2 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	3.8	10	ns
t_r	Rise Time		–	1.3	10	ns
$t_{d(off)}$	Turn–Off Delay Time		–	10	20	ns
t_f	Fall Time		–	1.5	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 50 V, I_D = 3.2 A	–	4.3	7	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 5 V, V_{DD} = 50 V, I_D = 3.2 A	–	2.4	4	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 50 V, I_D = 3.2 A	–	0.7	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	0.9	–	nC
DRAIN–SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 3.2 A (Note 2) V_{GS} = 0 V, I_S = 1 A (Note 2)	– –	0.86 0.77	1.3 1.2	V
t_{rr}	Reverse Recovery Time	I_F = 3.2 A, di/dt = 100 A/s	–	31	49	ns
Q_{rr}	Reverse Recovery Charge		–	21	34	nC

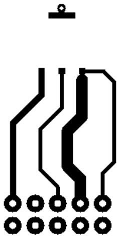
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

1. $R_{\theta JA}$ is 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 user’s board design.



a. 55°C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 118°C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.
3. Starting T_J = 25°C, L = 1 mH, I_{AS} = 5 A, V_{DD} = 90 V, V_{GS} = 10 V.
4. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

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

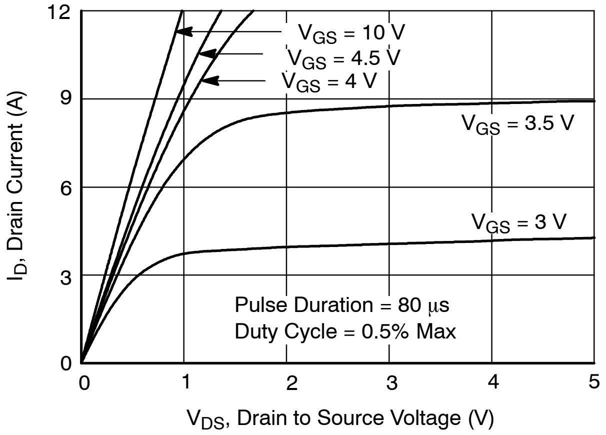


Figure 1. On−Region Characteristics

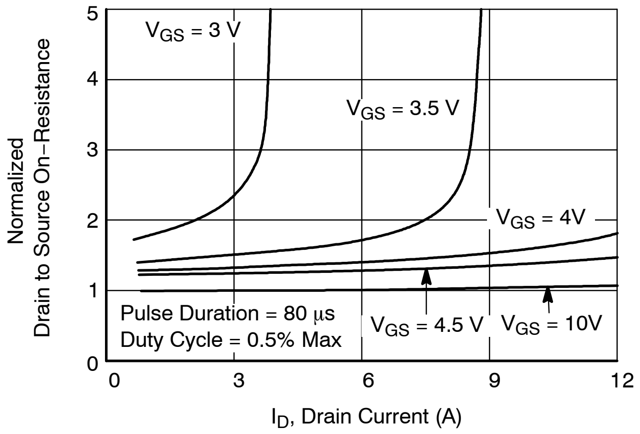


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

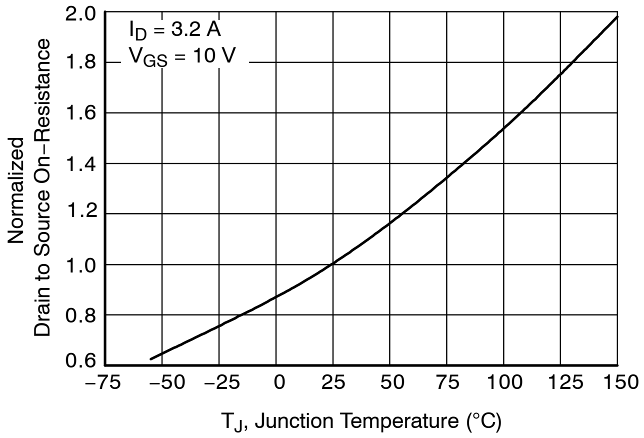


Figure 3. Normalized On−Resistance vs. Junction Temperature

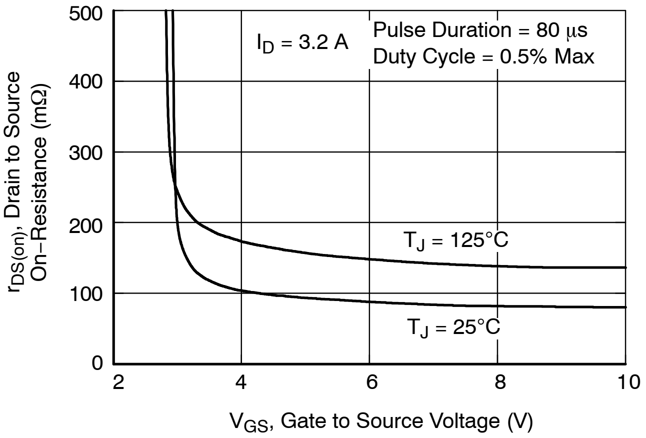


Figure 4. On−Resistance vs. Gate to Source Voltage

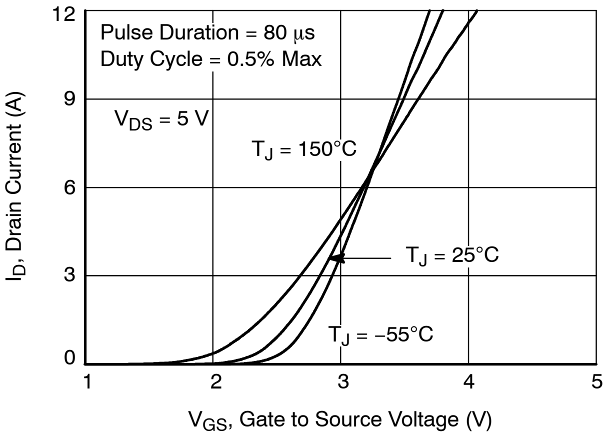


Figure 5. Transfer Characteristics

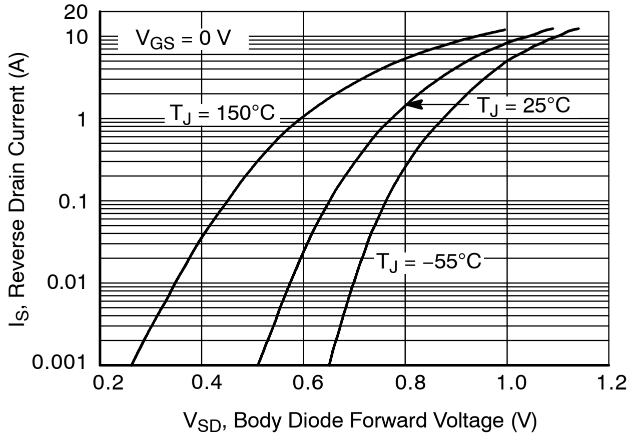


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

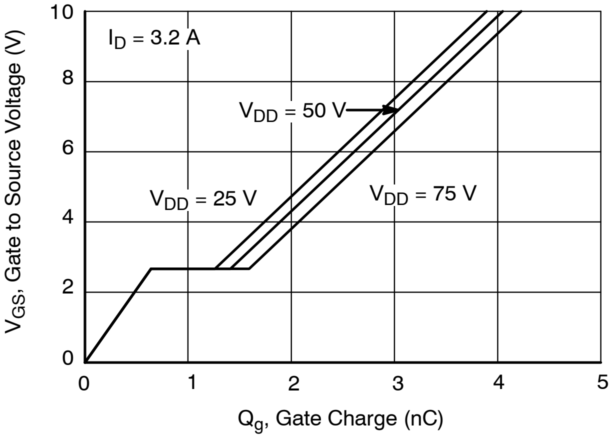


Figure 7. Gate Charge Characteristics

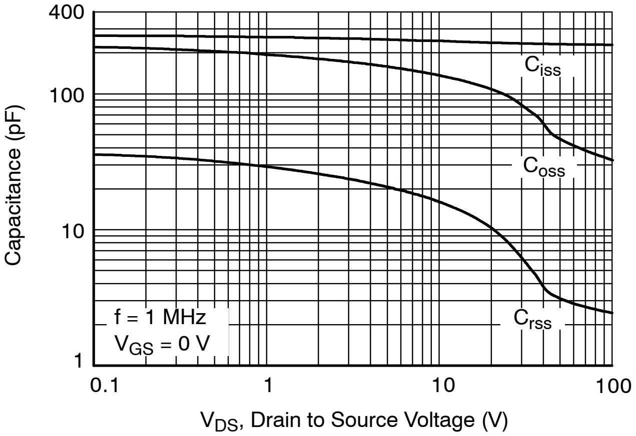


Figure 8. Capacitance vs. Drain to Source Voltage

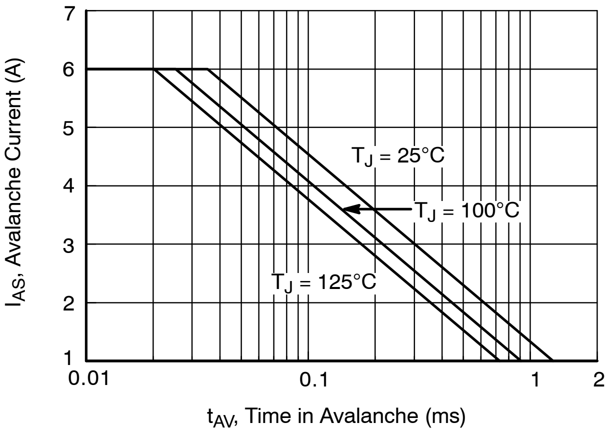


Figure 9. Unclamped Inductive Switching Capability

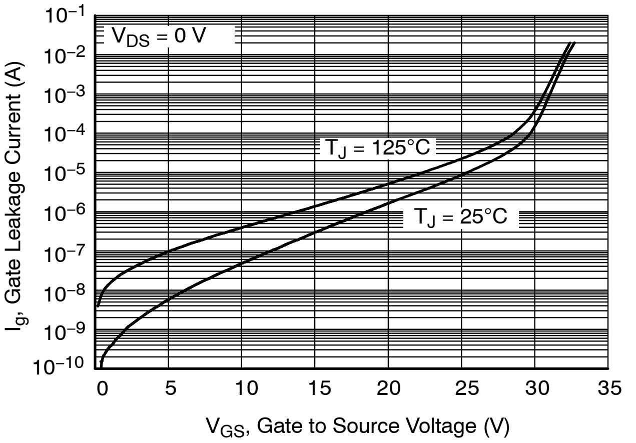


Figure 10. Gate Leakage Current vs. Gate to Source Voltage

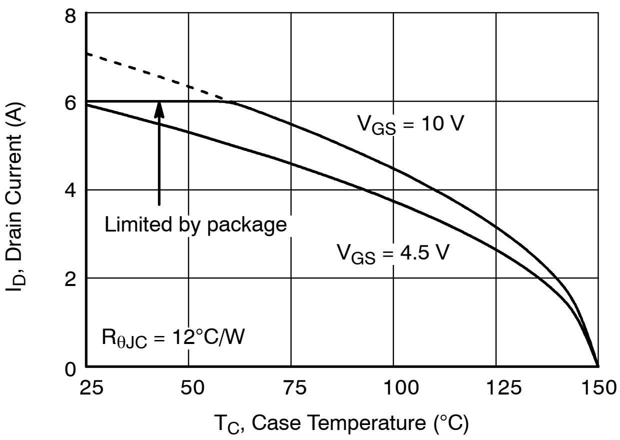


Figure 11. Maximum Continuous Drain Current vs. Case temperature

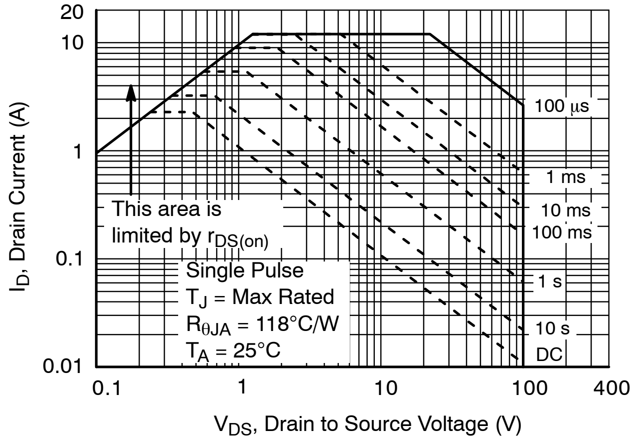


Figure 12. Forward Bias Safe Operating Area

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

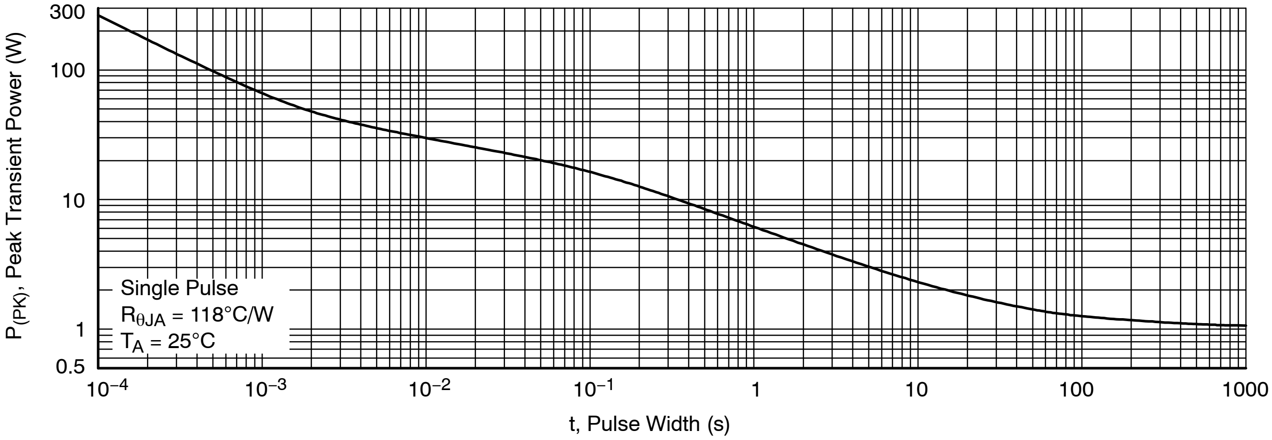


Figure 13. Single Pulse Maximum Power Dissipation

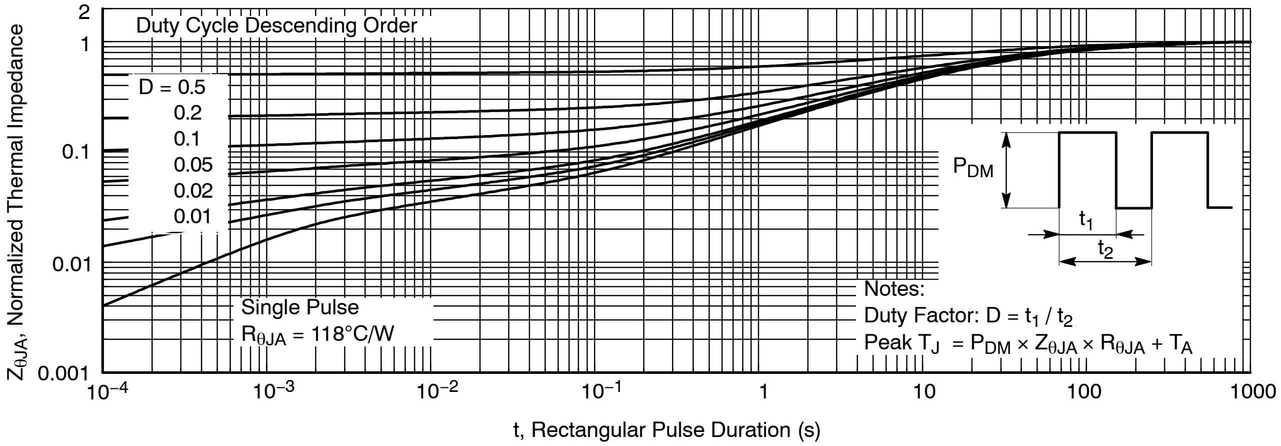
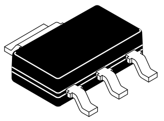


Figure 14. Junction−to−Ambient Transient Thermal Response Curve

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

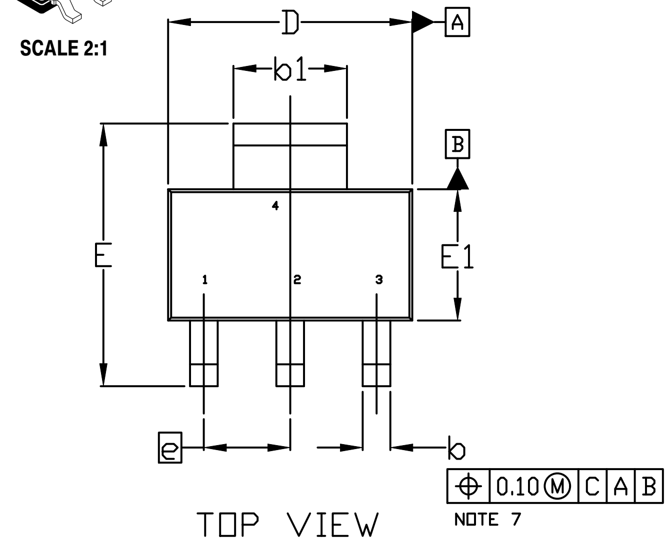
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SCALE 2:1

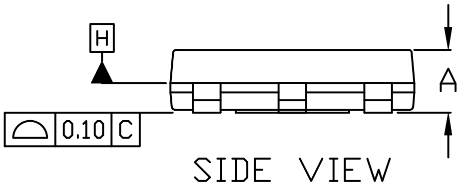
SOT−223
CASE 318H
ISSUE B

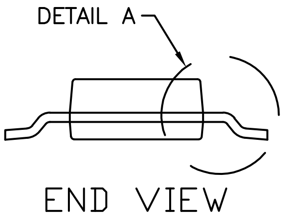
DATE 13 MAY 2020

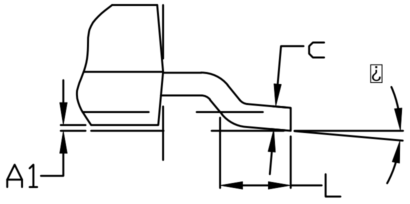


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E1 ARE DETERMINED AT DATUM H. DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. SHALL NOT EXCEED 0.23mm PER SIDE.
4. LEAD DIMENSIONS b AND b1 DO NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBBAR PROTRUSION IS 0.08mm PER SIDE.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
7. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

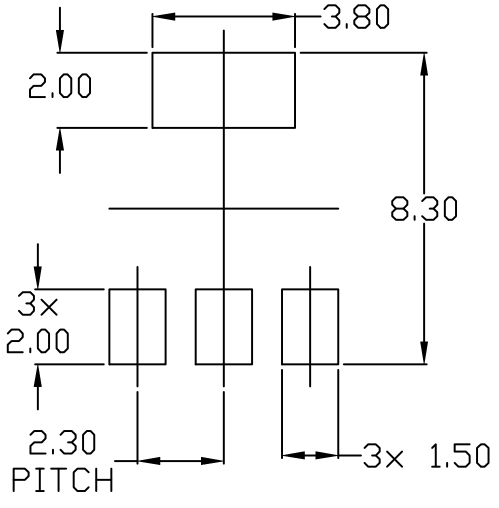
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	1.80
A1	0.02	0.06	0.11
b	0.60	0.74	0.88
b1	2.90	3.00	3.10
c	0.24	---	0.35
D	6.30	6.50	6.70
E	6.70	7.00	7.30
E1	3.30	3.50	3.70
e	2.30 BSC		
L	0.25	---	---
¿	0°	---	10°







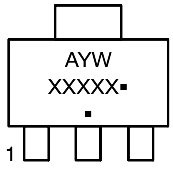
DETAIL A



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.

GENERIC MARKING DIAGRAM*



A	= Assembly Location
Y	= Year
W	= Work Week
XXXXX	= Specific Device Code
▪	= Pb−Free Package

(Note: Microdot may be in either location)

*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:	**98ASH70634A**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**SOT−223**	**PAGE 1 OF 1**

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.

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

◊

DiGi
Electronics

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we striciy control the quality of products and services. Welcome your RFQ to Email: Info@DiGi-Electronics.com

DCI.

QUALITY MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T 19001-2016 idt ISO9001:2015

DCI Certification Ltd

DCI.

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T 24001-2016 idt ISO14001:2015

DCI Certification Ltd

DCI.

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T45001-2020 idt ISO45001:2018

DCI Certification Ltd

CR

CERTIFICATE OF INCORPORATION

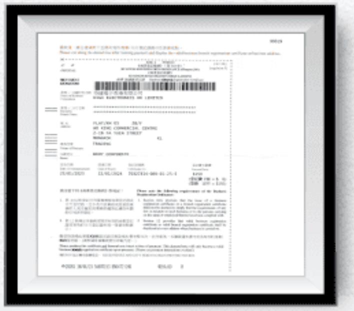
ASA

MEMBERSHIP
Certificate

DIGI ELECTRONICS HK LIMITED

dun & bradstreet

A Dun & Bradstreet
D-U-N-S® Registered™ Business



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.