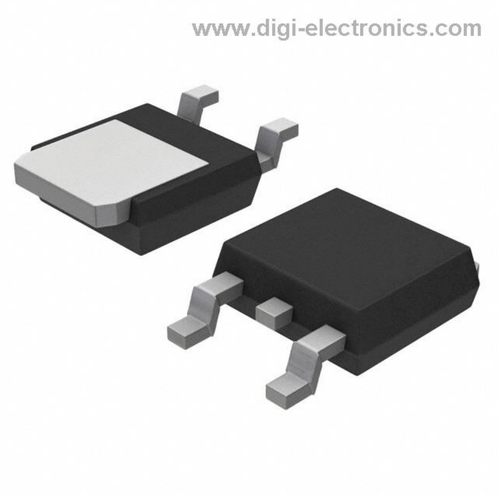
NVD5C434NT4G Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	NVD5C434NT4G-DG
Manufacturer	onsemi
Manufacturer Product Number	NVD5C434NT4G
Description	MOSFET N-CHANNEL 40V 163A DPAK
Detailed Description	N-Channel 40 V 163A (Tc) 117W (Tc) Surface Mount DPAK

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
NVD5C434NT4G	onsemi
Series:	Product Status:
-	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
40 V	163A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
10V	2.1mOhm @ 50A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250µA	80.6 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	5400 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	117W (Tc)
Operating Temperature:	Grade:
-55°C ~ 175°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Supplier Device Package:	Package / Case:
DPAK	TO-252-3, DPAK (2 Leads + Tab), SC-63
Base Product Number:	
NVD5C434	

Environmental & Export classification

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

NVD5C434N

MOSFET – Power, Single, N-Channel

40 V, 2.1 mΩ, 163 A

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	40	V
Gate−to−Source Voltage			V_{GS}	± 20	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1 & 3)	Steady State	T_C = 25°C	I_D	163	A
		T_C = 100°C		115	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	117	W
		T_C = 100°C		58	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2 & 3)	Steady State	T_A = 25°C	I_D	26	A
		T_A = 100°C		22	
Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)		T_A = 25°C	P_D	3.2	W
		T_A = 100°C		2.2	
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	900	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to 175	°C
Source Current (Body Diode)			I_S	130	A
Single Pulse Drain−to−Source Avalanche Energy (T_J = 25°C, $I_{L(pk)}$ = 25 A)			E_{AS}	420	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°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 RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case (Drain) (Note 1)	$R_{\theta JC}$	1.28	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	48	

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface−mounted on FR4 board using a 650 mm^2, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

ON Semiconductor®

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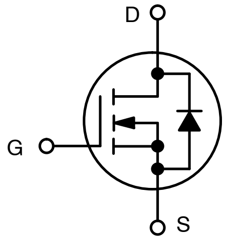
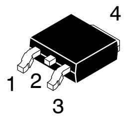
$V_{(BR)DSS}$	$R_{DS(on)}$	I_D
40 V	2.1 mΩ @ 10 V	163 A

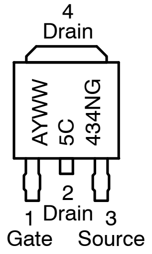


N−CHANNEL MOSFET



DPAK
CASE 369C
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENT



A = Assembly Location
Y = Year
WW = Work Week
5C434N = Device Code
G = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		40			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				18		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 40 V	T_J = 25°C			10	μA
			T_J = 125°C			250	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				7.9		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 50 A			1.7	2.1	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 3 V, I_D = 50 A			155		S
CHARGES, CAPACITANCES AND GATE RESISTANCES							
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 25 V			5400		pF
Output Capacitance	C_{oss}				3000		
Reverse Transfer Capacitance	C_{rss}				71		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 32 V, I_D = 50 A			80.6		nC
Threshold Gate Charge	$Q_{G(TH)}$				15.2		
Gate−to−Source Charge	Q_{GS}				25.2		
Gate−to−Drain Charge	Q_{GD}				15.4		
Plateau Voltage	V_{GP}				4.8		V
SWITCHING CHARACTERISTICS (Note 5)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 10 V, V_{DS} = 32 V, I_D = 50 A, R_G = 2.5 Ω			15		ns
Rise Time	t_r				78		
Turn−Off Delay Time	$t_{d(off)}$				43		
Fall Time	t_f				14		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 50 A	T_J = 25°C		0.8	1.2	V
			T_J = 125°C		0.7		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dIs/dt = 100 A/μs, I_S = 50 A			73		ns
Charge Time	ta				36		
Discharge Time	tb				37		
Reverse Recovery Charge	Q_{RR}				120		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. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

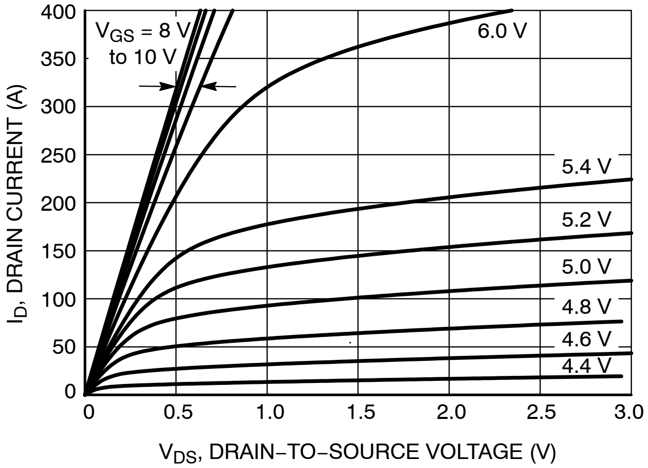


Figure 1. On−Region Characteristics

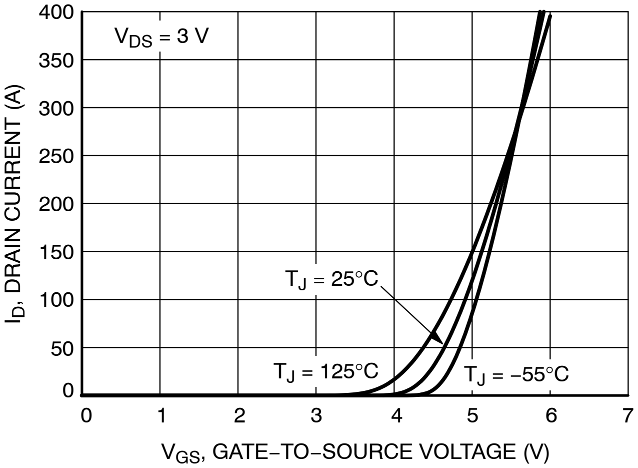


Figure 2. Transfer Characteristics

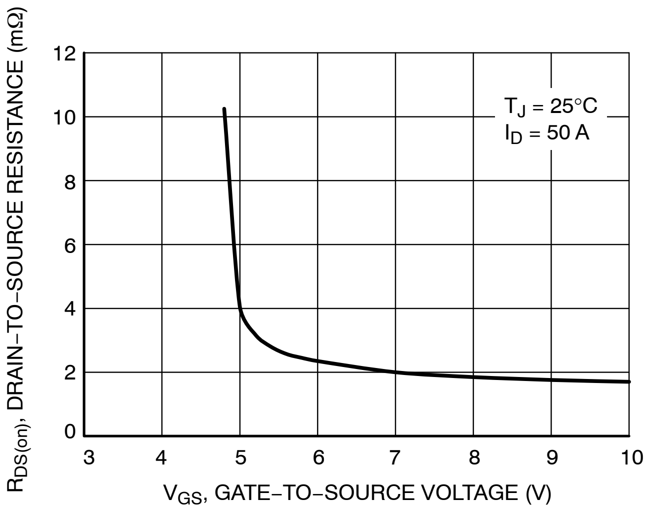


Figure 3. On−Resistance vs. Gate−to−Source Voltage

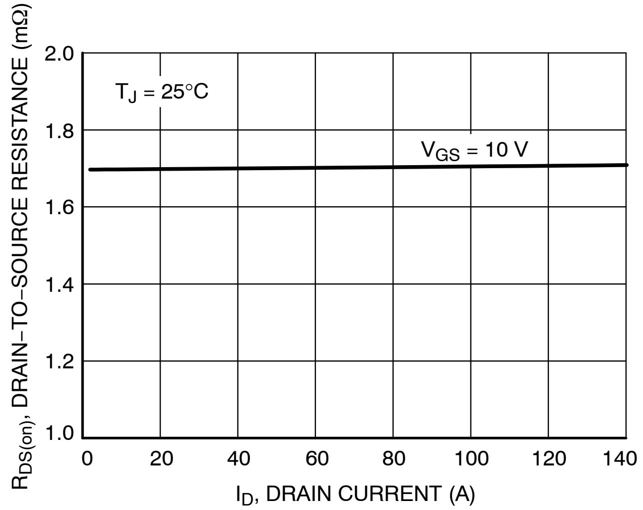


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

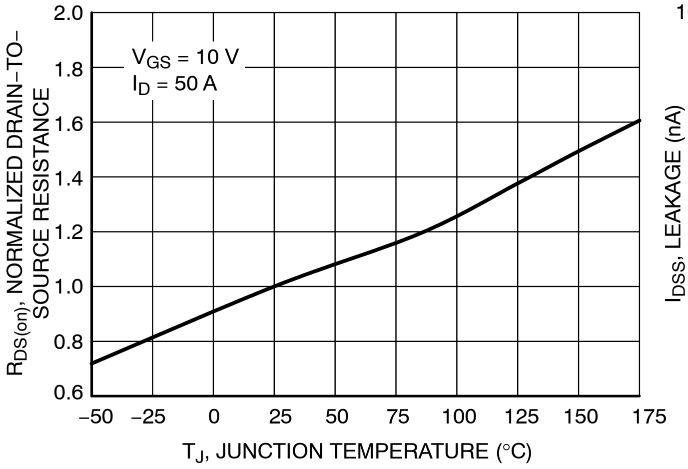


Figure 5. On−Resistance Variation with Temperature

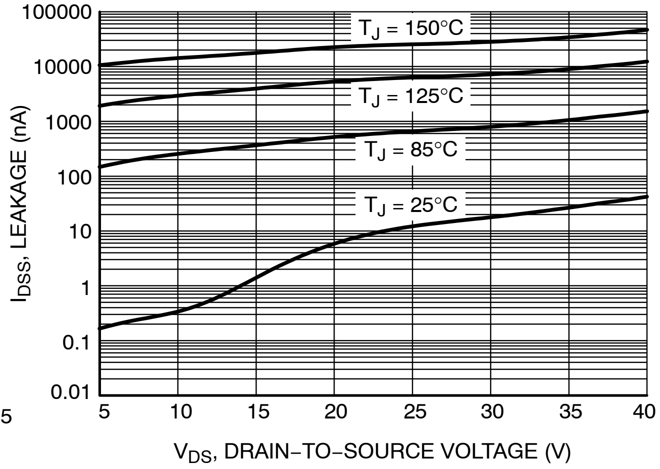


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

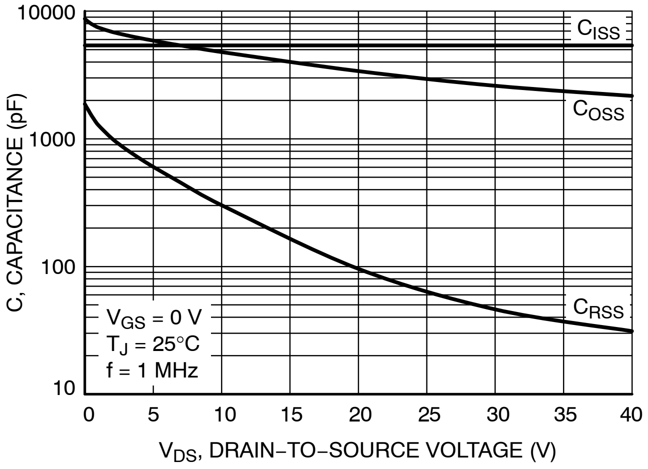


Figure 7. Capacitance Variation

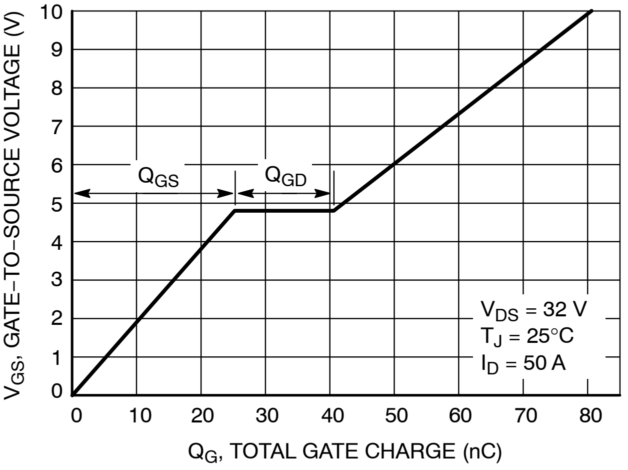


Figure 8. Gate−to−Source vs. Total Charge

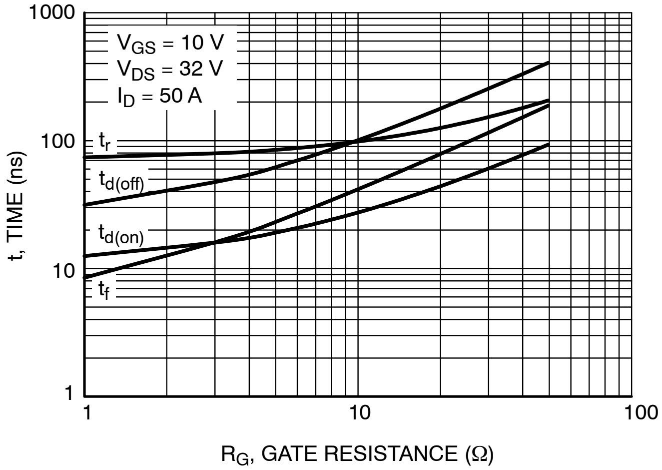


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

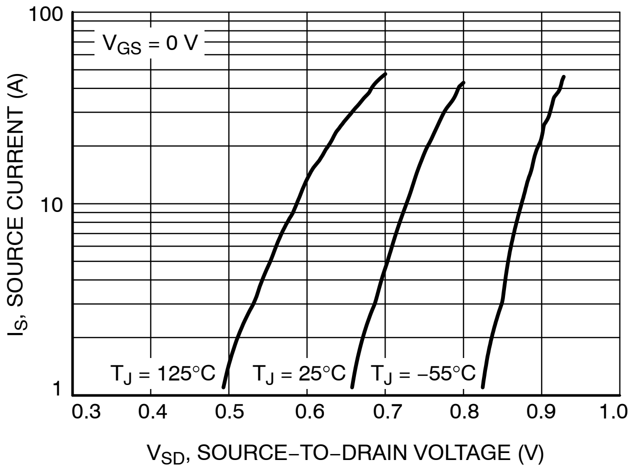


Figure 10. Diode Forward Voltage vs. Current

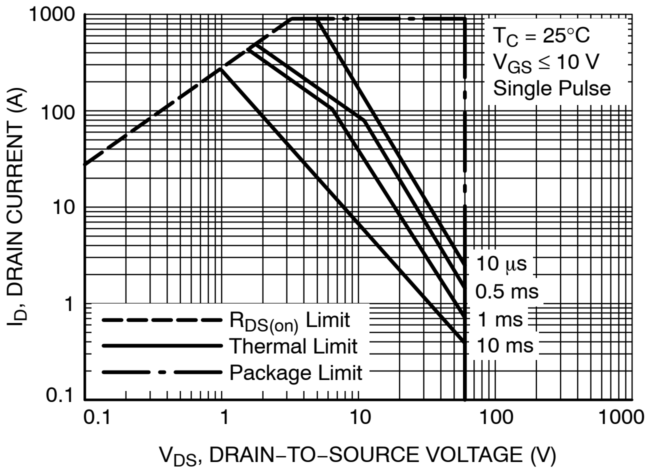


Figure 11. Maximum Rated Forward Biased Safe Operating Area

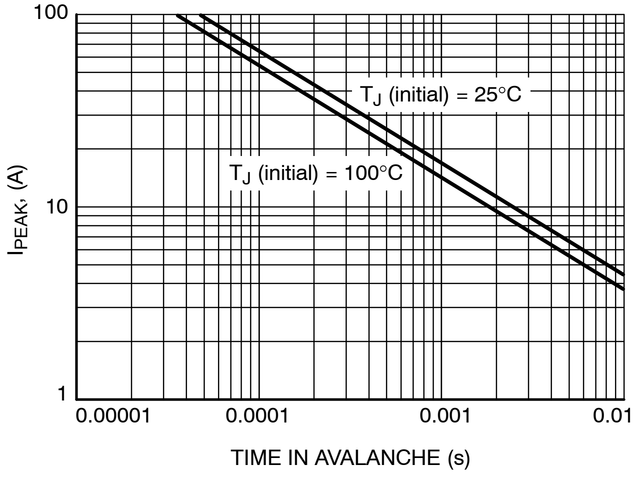


Figure 12. I_{PEAK} vs. Time in Avalanche

TYPICAL CHARACTERISTICS

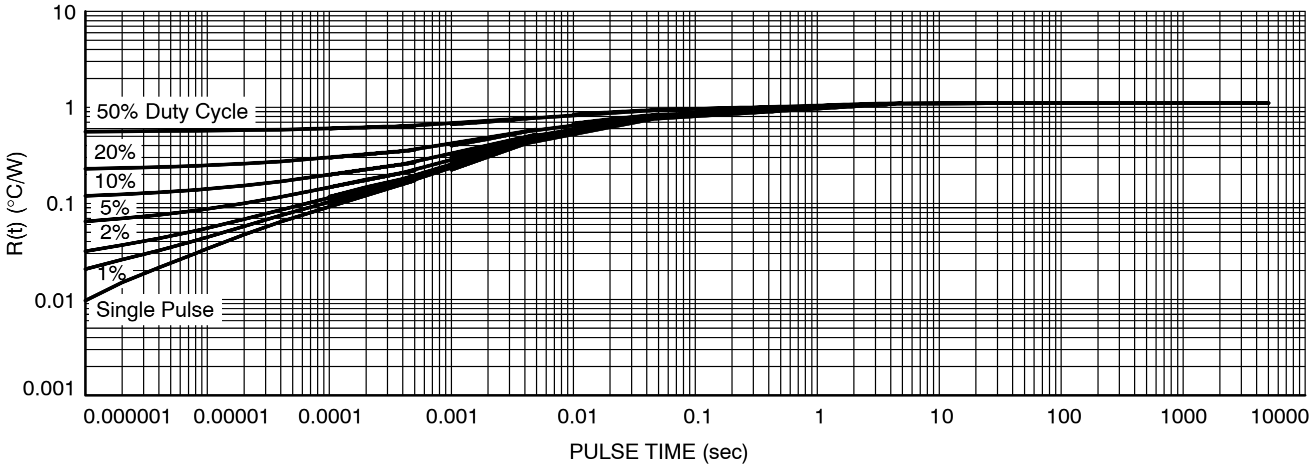


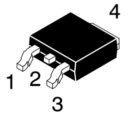
Figure 13. Thermal Characteristics

ORDERING INFORMATION

Order Number	Package	Shipping†
NVD5C434NT4G	DPAK (Pb−Free)	2500 / 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.

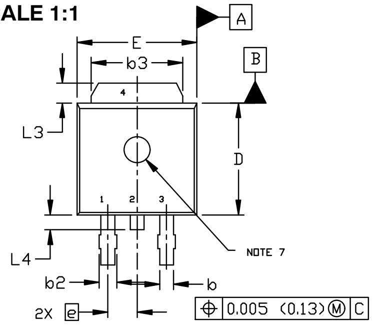
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



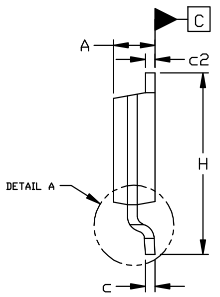
SCALE 1:1

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE G

DATE 31 MAY 2023



TOP VIEW

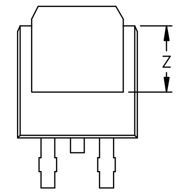


SIDE VIEW

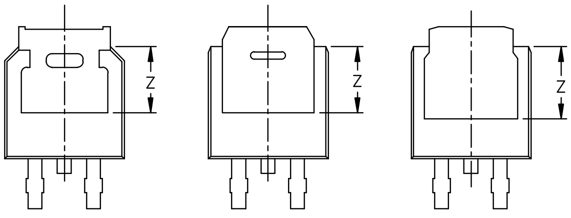
NOTES:

1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3, AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114 REF		2.90 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	----	0.040	---	1.01
Z	0.155	----	3.93	---

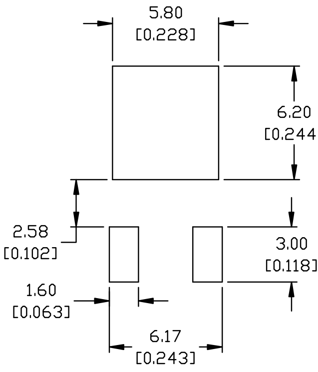


BOTTOM VIEW



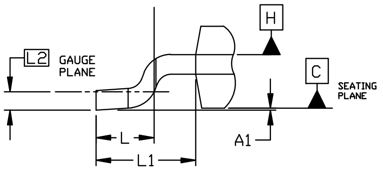
BOTTOM VIEW

ALTERNATE CONSTRUCTIONS



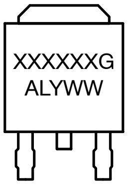
RECOMMENDED MOUNTING FOOTPRINT*

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



DETAIL A
ROTATED 90° CW

GENERIC MARKING DIAGRAM*



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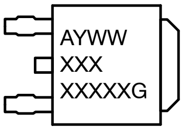

Discrete

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

*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.

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 5:
PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 8:
PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

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DESCRIPTION:	**DPAK (SINGLE GAUGE)**	**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

◊

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

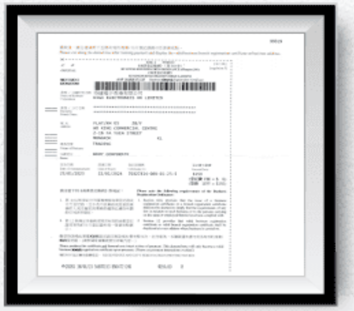
DCI.
ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE
DIGI ELECTRONICS HK LIMITED
GB/T 24001-2016 idt ISO14001:2015
DCI Certification Ltd

DCI.
OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM CERTIFICATE
DIGI ELECTRONICS HK LIMITED
GB/T45001-2020 idt ISO45001:2018
DCI Certification Ltd

CR
CERTIFICATE OF INCORPORATION
I hereby certify that
DIGI ELECTRONICS HK LIMITED
is this day incorporated in Hong Kong under the Companies Ordinance (Chapter 622 of the Laws of Hong Kong), and that this company is a limited company.
Registrar of Companies
Hong Kong Special Administrative Region

ASA
MEMBERSHIP
Certificate
The Aviation Suppliers Association has enrolled as a Regular Member
DIGI ELECTRONICS HK LIMITED
Michele Dickstein
President

dun & bradstreet
A Dun & Bradstreet
D-U-N-S® Registered™ Business
This is to certify that the following entity is a D-U-N-S® Registered™ business in the Dun & Bradstreet global database with information verified and validated:



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

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