

MOSFET – Power, Single, N-Channel

40 V, 3.9 mΩ, 88 A

NVD5C454NL

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 ($T_J = 25^\circ\text{C}$ 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)	I_D	84	A
		60	
Power Dissipation $R_{\theta JC}$ (Note 1)	P_D	56	W
		28	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2 & 3)	I_D	20	A
		14	
Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)	P_D	3.1	W
		1.5	
Pulsed Drain Current	I_{DM}	463	A
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to 175	°C
Source Current (Body Diode)	I_S	46	A
Single Pulse Drain-to-Source Avalanche Energy ($T_J = 25^\circ\text{C}$, $I_{L(pk)} = 8.3\text{ A}$)	E_{AS}	205	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	°C

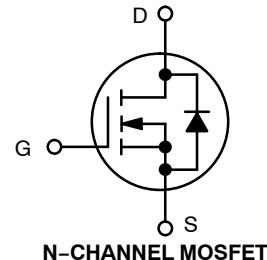
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

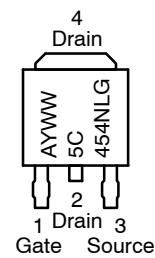
Parameter	Symbol	Value	Unit
Junction-to-Case (Drain) (Note 1)	$R_{\theta JC}$	2.7	°C/W
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	48.4	

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 mm², 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.

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D
40 V	3.9 mΩ @ 10 V	88 A
	5.7 mΩ @ 4.5 V	



MARKING DIAGRAM & PIN ASSIGNMENT



A = Assembly Location
Y = Year
WW = Work Week
5C454NL = Device Code
G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

NVD5C454NL

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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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}			11		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 = 70 μA	1.2		2.2	V
Negative Threshold Temperature Coefficient	V _{GS(TH)/T_J}			5.2		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 40 A		4.5	5.7	mΩ
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 40 A		3.3	3.9	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 3 V, I _D = 40 A		106		S

CHARGES, CAPACITANCES AND GATE RESISTANCES

Input Capacitance	C _{iss}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 25 V		2600		pF
Output Capacitance	C _{oss}			1000		
Reverse Transfer Capacitance	C _{rss}			43		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 32 V, I _D = 40 A		21		nC
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 32 V, I _D = 40 A		43		nC
Threshold Gate Charge	Q _{G(TH)}			4.5		
Gate-to-Source Charge	Q _{GS}			8.4		
Gate-to-Drain Charge	Q _{GD}			6.9		
Plateau Voltage	V _{GP}			3.3		V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DS} = 32 V, I _D = 40 A, R _G = 2.5 Ω		10		ns
Rise Time	t _r			38		
Turn-Off Delay Time	t _{d(off)}			33		
Fall Time	t _f			7		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 40 A	T _J = 25 °C		0.88	1.2	V
			T _J = 125 °C		0.78		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 40 A			43		ns
Charge Time	t _a				21		
Discharge Time	t _b				21		
Reverse Recovery Charge	Q _{RR}				30		nC

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

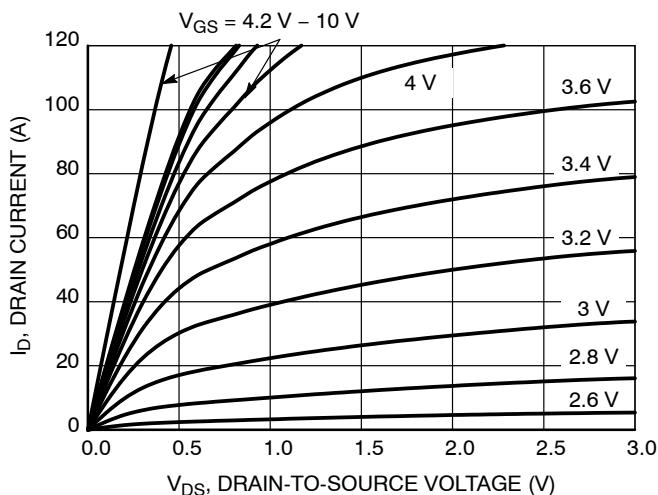


Figure 1. On-Region Characteristics

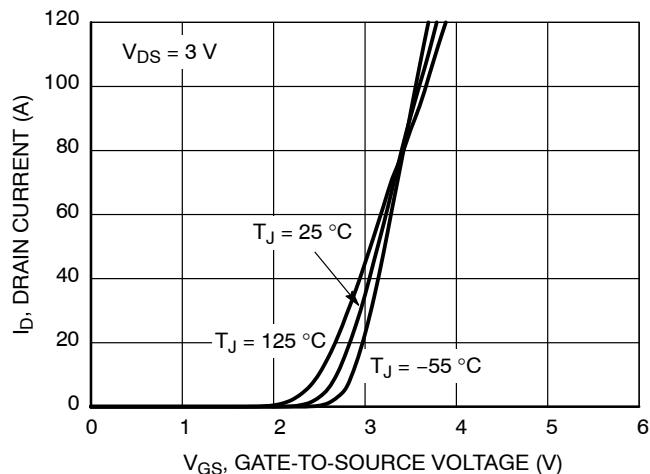


Figure 2. Transfer Characteristics

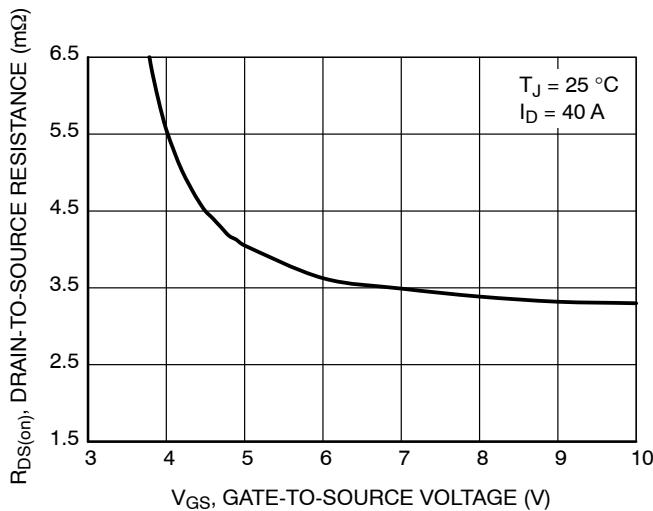


Figure 3. On-Resistance vs. Gate-to-Source Voltage

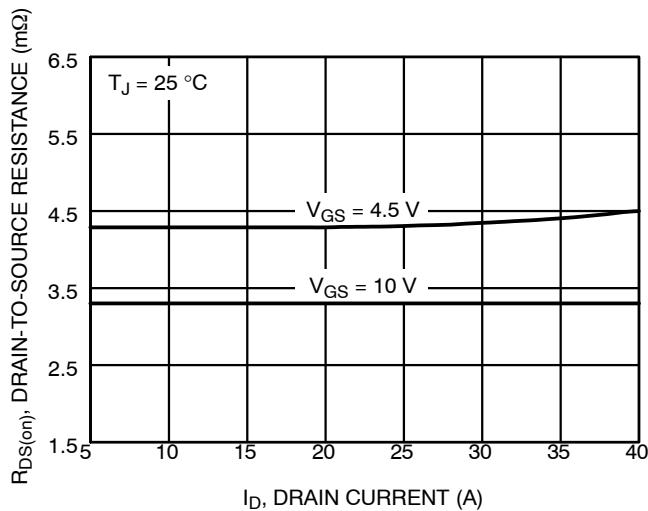


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

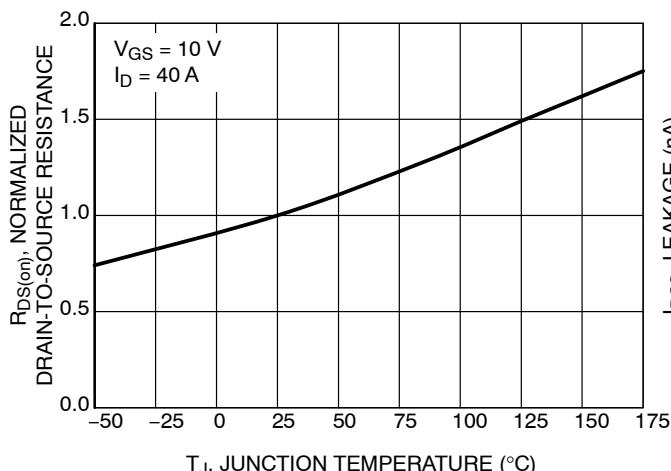


Figure 5. On-Resistance Variation with Temperature

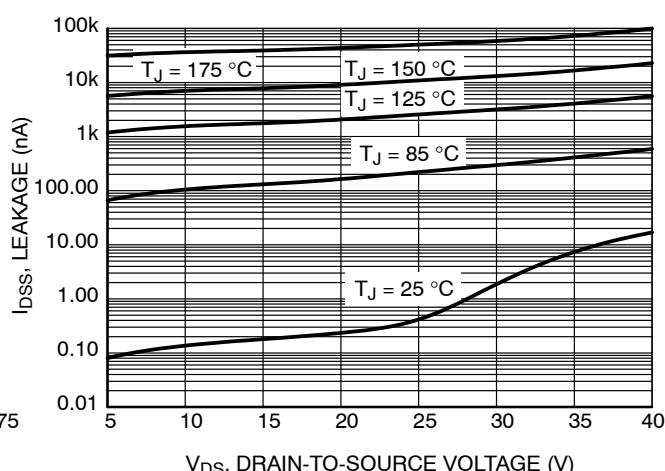


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

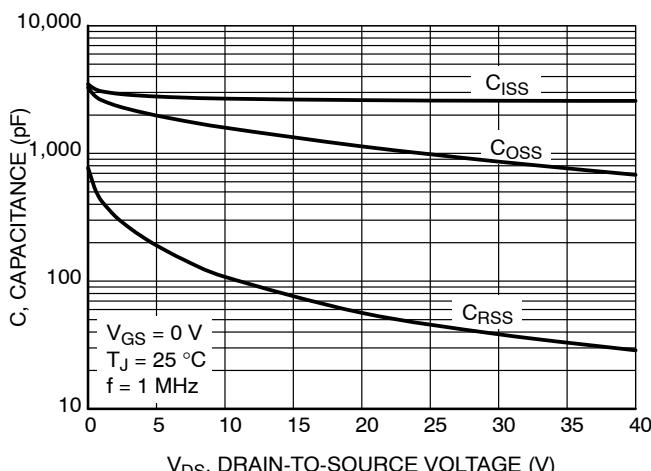


Figure 7. Capacitance Variation

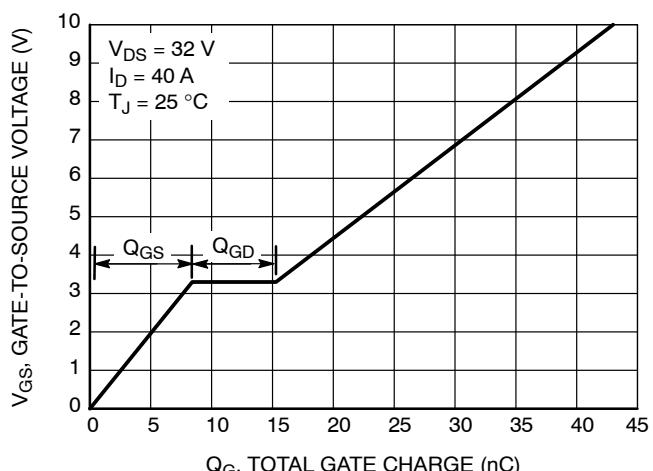


Figure 8. Gate-to-Source vs. Total Charge

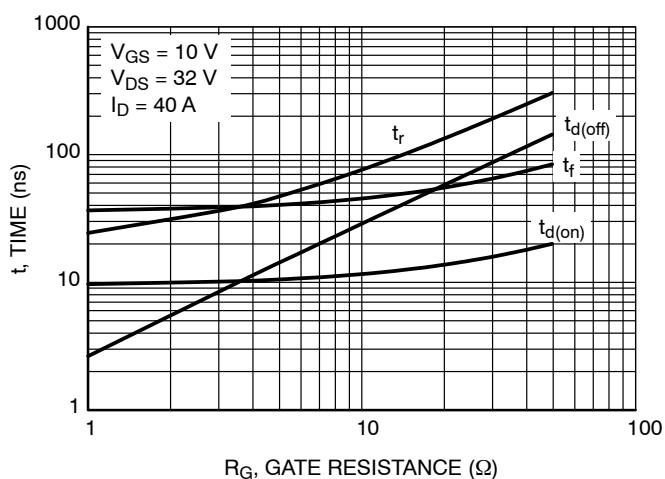


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

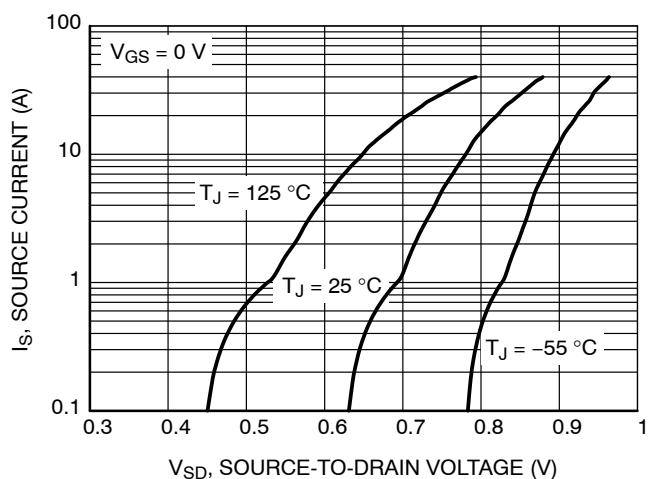


Figure 10. Diode Forward Voltage vs. Current

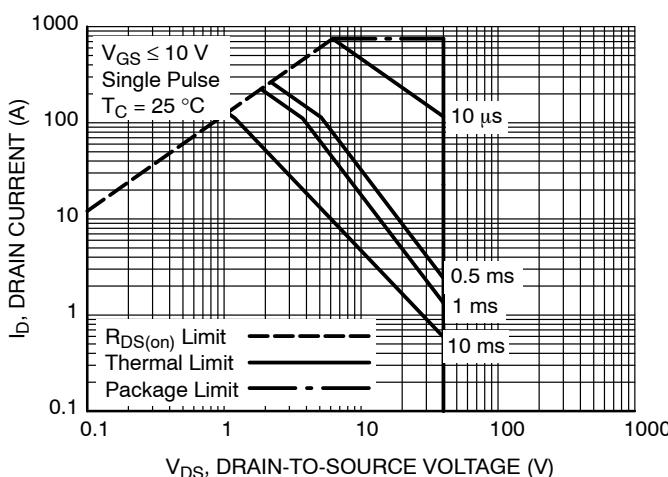


Figure 11. Maximum Rated Forward Biased Safe Operating Area

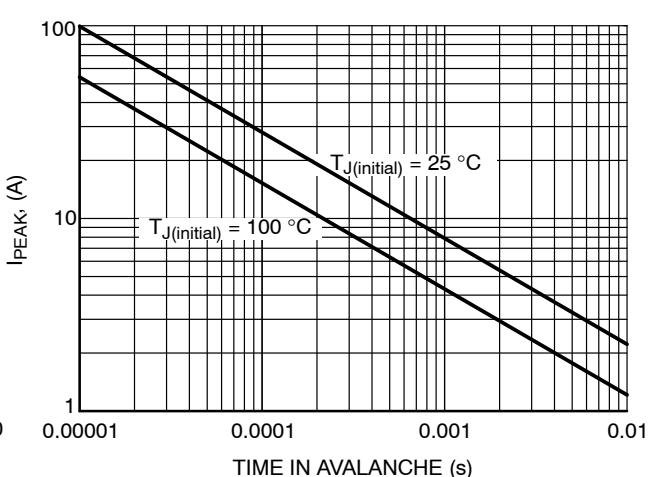


Figure 12. Maximum Drain Current vs. Time in Avalanche

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TYPICAL CHARACTERISTICS

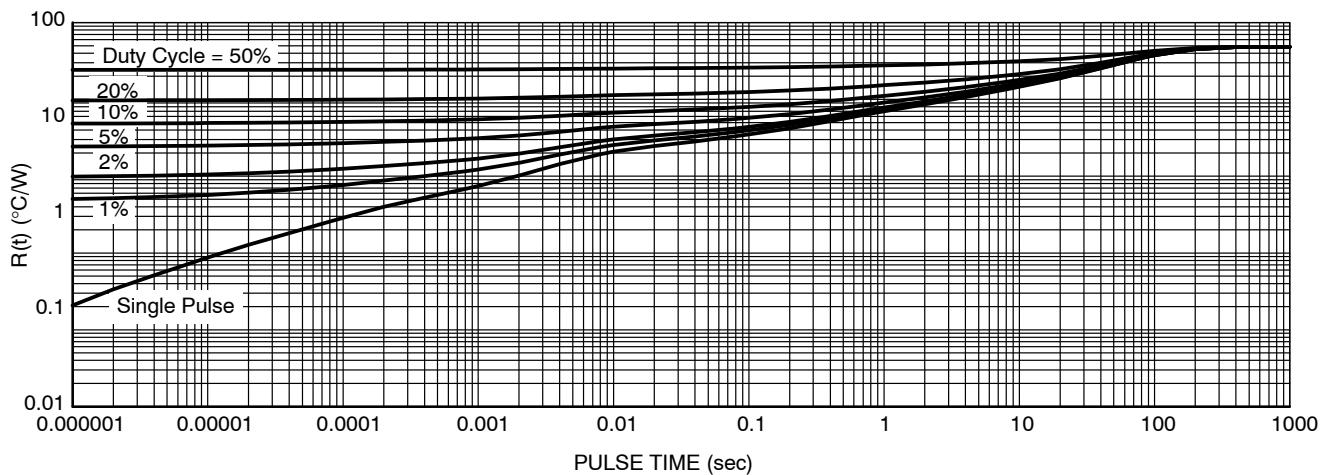


Figure 13. Thermal Response

ORDERING INFORMATION

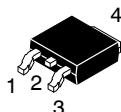
Order Number	Package	Shipping [†]
NVD5C454NLT4G	DPAK3 (Pb-Free)	2500 / Tape & Reel

[†] 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](#).

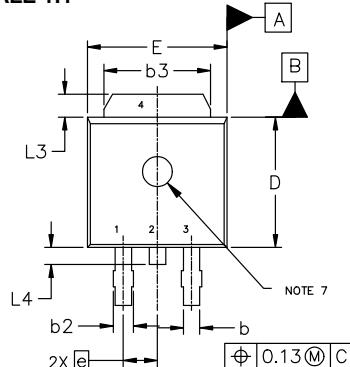
REVISION HISTORY

Revision	Description of Changes	Date
1	Document rebranded to onsemi format.	10/3/2025

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



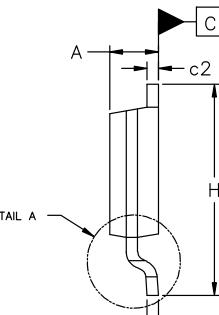
SCALE 1:1



TOP VIEW

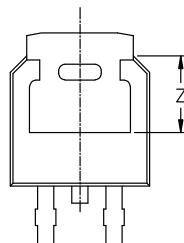
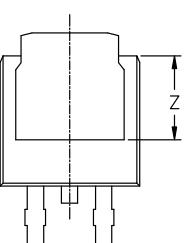
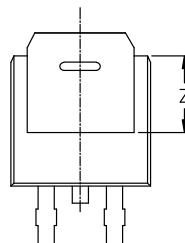
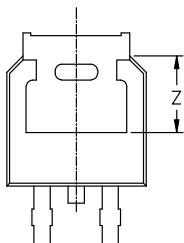
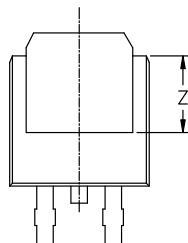
DPAK3 6.10x6.54x2.28, 2.29P
CASE 369C
ISSUE J

DATE 12 AUG 2025



SIDE VIEW

MILLIMETERS			
DIM	MIN	NOM	MAX
A	2.18	2.28	2.38
A1	0.00	---	0.13
b	0.63	0.76	0.89
b2	0.72	0.93	1.14
b3	4.57	5.02	5.46
c	0.46	0.54	0.61
c2	0.46	0.54	0.61
D	5.97	6.10	6.22
E	6.35	6.54	6.73
e	2.29	2.29 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	---	1.27
L4	---	---	1.01
Z	3.93	---	---

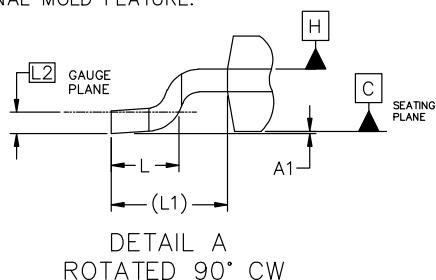
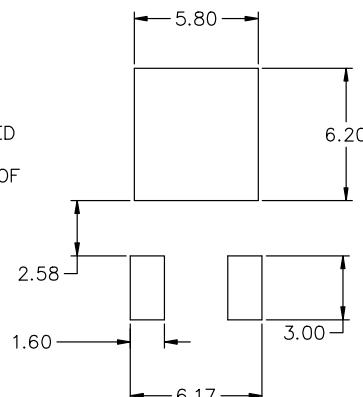


BOTTOM VIEW

ALTERNATE CONSTRUCTIONS

NOTES:

1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
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 0.15mm 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.

DETAIL A
ROTATED 90° CW

RECOMMENDED MOUNTING FOOTPRINT*

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

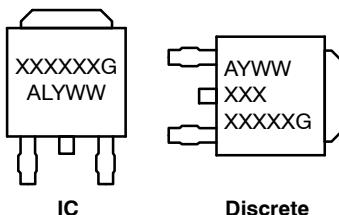
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CASE 369C
ISSUE J

DATE 12 AUG 2025

GENERIC MARKING DIAGRAM*



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	STYLE 2: PIN 1. GATE	STYLE 3: PIN 1. ANODE	STYLE 4: PIN 1. CATHODE	STYLE 5: PIN 1. GATE
2. COLLECTOR	2. DRAIN	2. CATHODE	2. ANODE	2. ANODE
3. Emitter	3. SOURCE	3. ANODE	3. GATE	3. CATHODE
4. COLLECTOR	4. DRAIN	4. CATHODE	4. ANODE	4. ANODE

STYLE 6: PIN 1. MT1	STYLE 7: PIN 1. GATE	STYLE 8: PIN 1. N/C	STYLE 9: PIN 1. ANODE	STYLE 10: PIN 1. CATHODE
2. MT2	2. COLLECTOR	2. CATHODE	2. CATHODE	2. ANODE
3. GATE	3. Emitter	3. ANODE	3. RESISTOR ADJUST	3. CATHODE
4. MT2	4. COLLECTOR	4. CATHODE	4. CATHODE	4. ANODE

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