NCV8450, NCV8450A

Self-Protected High Side Driver with Temperature and Current Limit

The NCV8450/A is a fully protected High−Side Smart Discrete device with a typical $R_{DS(on)}$ of 1.0 Ω and an internal current limit of 0.8 A typical. The device can switch a wide variety of resistive, inductive, and capacitive loads.

Features

- Short Circuit Protection
- Thermal Shutdown with Automatic Restart
- Overvoltage Protection
- Integrated Clamp for Inductive Switching
- Loss of Ground Protection
- ESD Protection
- Slew Rate Control for Low EMI
- Very Low Standby Current
- NCV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
- This is a Pb−Free Device

Typical Applications

- Automotive
- Industrial

PRODUCT SUMMARY

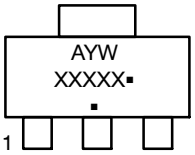
Symbol	Characteristics	Value	Unit
V_{IN_CL}	Overvoltage Protection	54	V
$V_{D(on)}$	Operation Voltage	4.5 – 45	V
R_{on}	On−State Resistance	1.0	Ω

ON Semiconductor®

http://onsemi.com

MARKING DIAGRAM

SOT−223
(TO−261)
CASE 318E



XXXXX = V8450 or 8450A
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

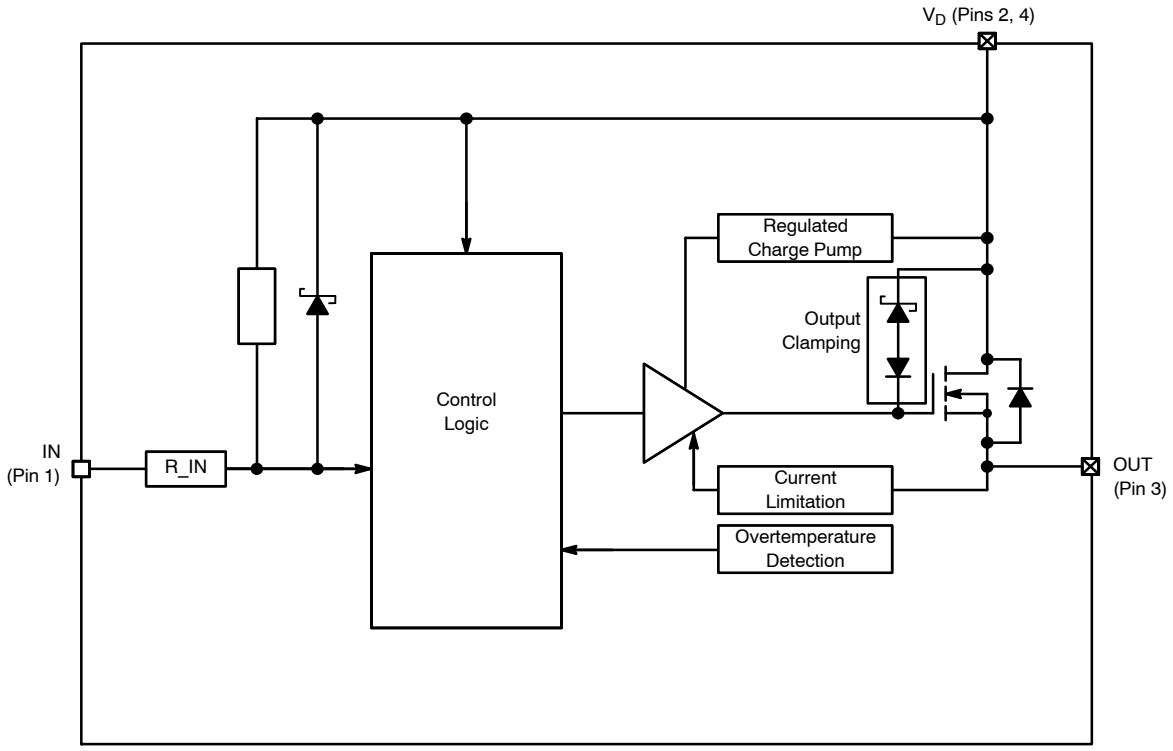


Figure 1. Block Diagram

PACKAGE PIN DESCRIPTION

Pin #	Symbol	Description
1	IN	Control Input, Active Low
2	V_D	Supply Voltage
3	OUT	Output
4	V_D	Supply Voltage

MAXIMUM RATINGS

Rating	Symbol	Value		Unit
		Min	Max	
DC Supply Voltage (Note 1)	V_D	−16	45	V
Load Dump Protection (RI = 2 Ω, t_d = 400 ms, V_{IN} = 0, 10 V, I_L = 150 mA, V_{bb} = 13.5 V)	$V_{Loaddump}$		100	V
Input Current	I_{in}	−15	15	mA
Output Current (Note 1)	I_{out}		Internally Limited	A
Total Power Dissipation @ T_A = 25°C (Note 2) @ T_A = 25°C (Note 3)	P_D	1.13 1.60		W
Electrostatic Discharge (Note 4) (Human Body Model (HBM) 100 pF/1500 Ω) Input All other			 1 5	kV
Single Pulse Inductive Load Switching Energy (Note 4) (V_{DD} = 13.5 V, I = 465 mApk, L = 200 mH, T_{JStart} = 150°C)	E_{AS}		29	mJ
Operating Junction Temperature	T_J	−40	+150	°C
Storage Temperature	$T_{storage}$	−55	+150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Reverse Output current has to be limited by the load to stay within absolute maximum ratings and thermal performance.
2. Minimum Pad.
3. 1 in square pad size, FR−4, 1 oz Cu.
4. Not subjected to production testing.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max Value	Unit
Thermal Resistance (Note 5) Junction−to−Ambient (Note 2) Junction−to−Ambient (Note 3)	 $R_{\theta JA}$ $R_{\theta JA}$	 110 78.3	K/W

5. Not subjected to production testing.

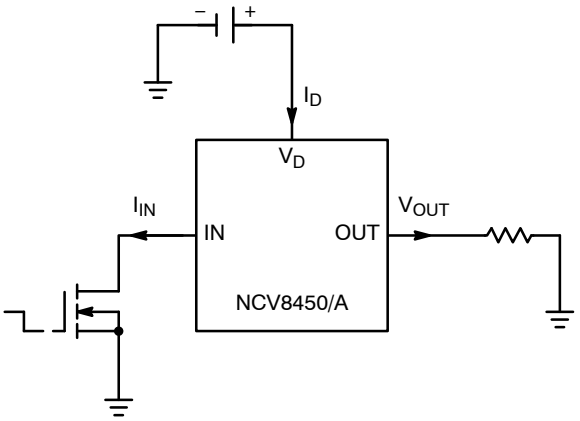


Figure 2. Applications Test Circuit

ELECTRICAL CHARACTERISTICS ($6 \le V_D \le 45$ V; $-40°C < T_J < 150°C$ unless otherwise specified)

Rating	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
OUTPUT CHARACTERISTICS						
Operating Supply Voltage	V_{SUPPLY}		4.5	–	45	V
On Resistance (Pin 1 Connected to GND)	R_{ON}	$T_J = 25°C$, $I_{OUT} = 150$ mA, $V_D = 7$ V – 45 V $T_J = 150°C$, $I_{OUT} = 150$ mA, $V_D = 7$ V – 45 V (Note 6) $T_J = 25°C$, $I_{OUT} = 150$ mA, $V_D = 6$ V		1.0 1.4 1.1	2 3 2.1	Ω
Standby Current (Pin 1 Open)	I_D	$V_D \le 20$ V $V_D > 20$ V		0.6	10 100	μA
INPUT CHARACTERISTICS						
Input Current – Off State	I_{IN_OFF}	$V_{OUT} \le 0.1$ V, $R_L = 270$ Ω, $T_J = 25°C$ $V_{OUT} \le 0.1$V, $R_L = 270$ Ω, $T_J = 150°C$ (Note 6)	−50 −40			μA
Input Current – On State (Pin 1 Grounded)	I_{IN_ON}			1.5	3	mA
Input Resistance (Note 6)	R_{IN}			1		kΩ
SWITCHING CHARACTERISTICS						
Turn−On Time (Note 7) ($V_{IN} = V_D$ to 0 V) to 90% V_{OUT}	t_{ON}	$R_L = 270$ Ω (Note 6) $V_D = 13.5$ V, $R_L = 270$ Ω, $T_J = 25°C$		30	125 100	μs
Turn−Off Time (Note 7) ($V_{IN} = 0$ V to V_D) to 10% V_{OUT}	t_{OFF}	$R_L = 270$ Ω (Note 6) $V_D = 13.5$ V, $R_L = 270$ Ω, $T_J = 25°C$		60	175 150	μs
Slew Rate On (Note 7) ($V_{IN} = V_D$ to 0V) 10% to 30% V_{OUT}	dV/dt_{ON}	$R_L = 270$ Ω (Note 6) $V_D = 13.5$ V, $R_L = 270$ Ω, $T_J = 25°C$		0.7	4 4	V/μs
Slew Rate Off (Note 7) ($V_{IN} = 0$ V to V_D) 70% to 40% V_{OUT}	dV/dt_{OFF}	$R_L = 270$ Ω (Note 6) $V_D = 13.5$ V, $R_L = 270$ Ω, $T_J = 25°C$		0.9	4 4	V/μs
OUTPUT DIODE CHARACTERISTICS (Note 6)						
Drain−Source Diode Voltage	V_F	$I_{OUT} = -0.2$ A		0.6		V
Continuous Reverse Drain Current	I_S	$T_J = 25°C$			0.2	A
PROTECTION FUNCTIONS (Note 8)						
Temperature Shutdown (Note 6)	T_{SD}		150	175	–	°C
Temperature Shutdown Hysteresis (Note 6)	T_{SD_HYST}			5		°C
Output Current Limit	I_{LIM}	$T_J = -40°C$, $V_D = 13.5$ V, $t_m = 100$ μs (Note 6) $T_J = 25$ °C, $V_D = 13.5$ V, $t_m = 100$ μs $T_J = 150$ °C , $V_D = 13.5$ V, $t_m = 100$ μs (Note 6)	 0.5	 0.8	1.5	A
Output Clamp Voltage (Inductive Load Switch Off) At $V_{OUT} = V_D - V_{CLAMP}$	V_{CLAMP}	$I_{OUT} = 4$ mA	45	52		V
Overvoltage Protection	V_{IN_CL}	$I_{CLAMP} = 4$ mA	50	54		V

6. Not subjected to production testing
7. Only valid with high input slew rates
8. Protection functions are not designed for continuous repetitive operation and are considered outside normal operating range

TYPICAL CHARACTERISTIC CURVES

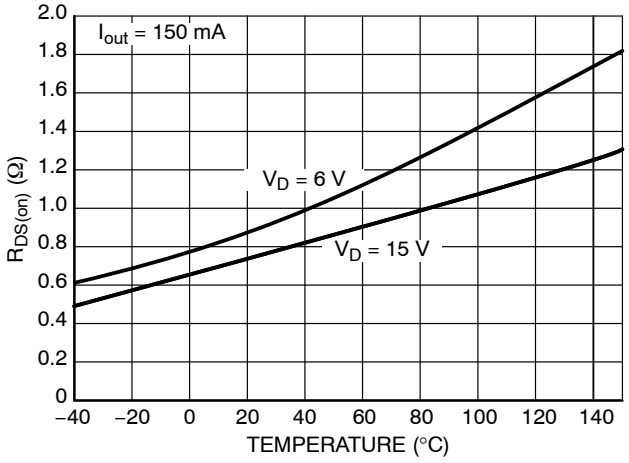


Figure 3. $R_{DS(on)}$ vs. Temperature

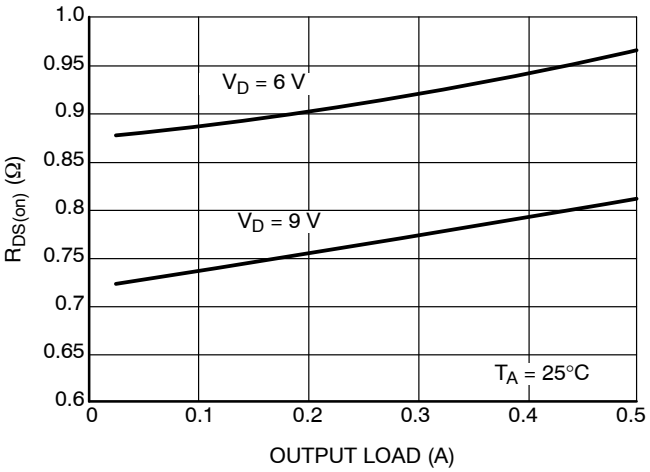


Figure 4. $R_{DS(on)}$ vs. Output Load

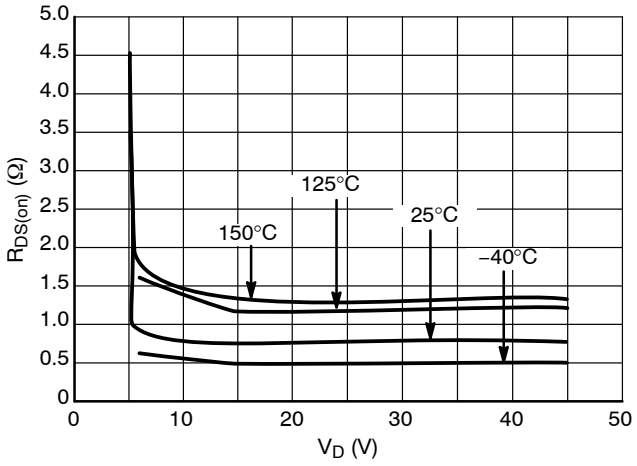


Figure 5. $R_{DS(on)}$ vs. V_D

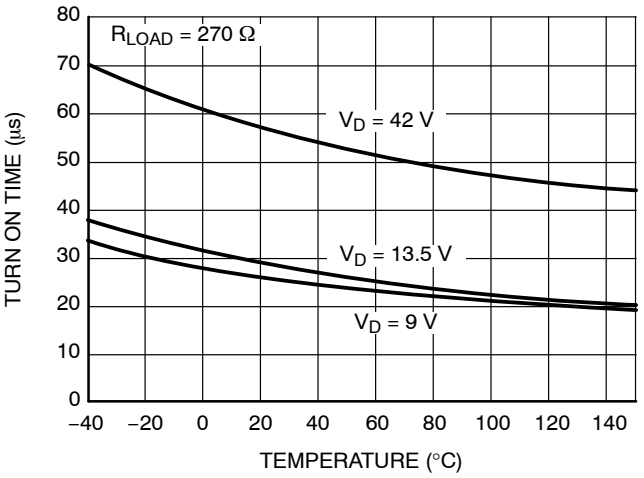


Figure 6. Turn On Time vs. Temperature

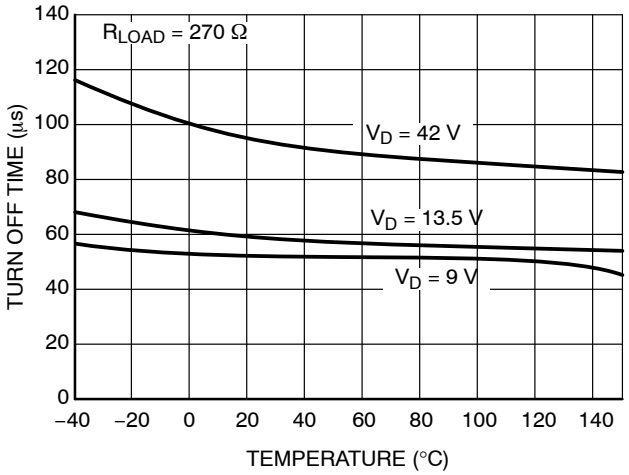


Figure 7. Turn Off Time vs. Temperature

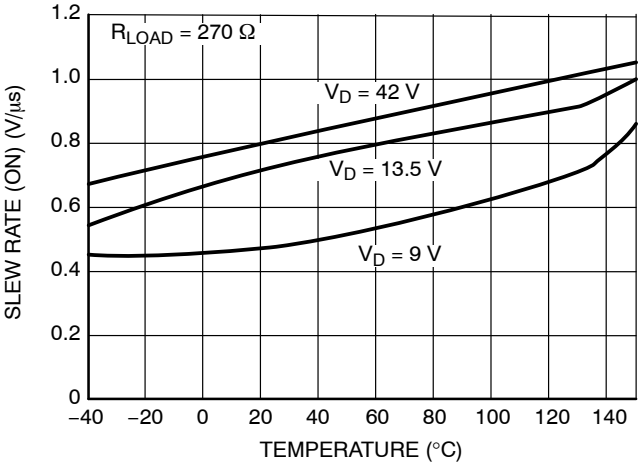


Figure 8. Slew Rate (ON) vs. Temperature

TYPICAL CHARACTERISTIC CURVES

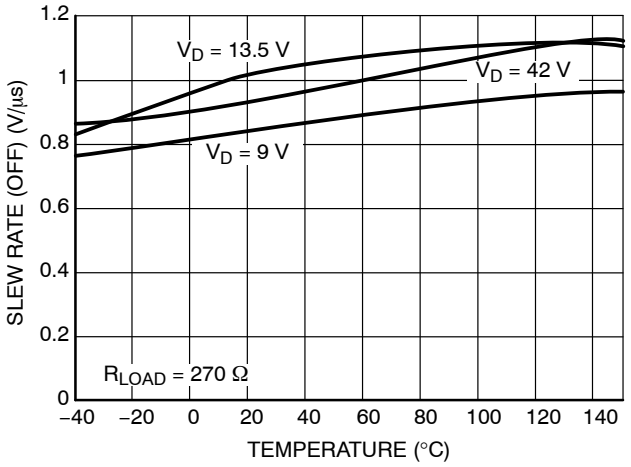


Figure 9. Slew Rate (OFF) vs. Temperature

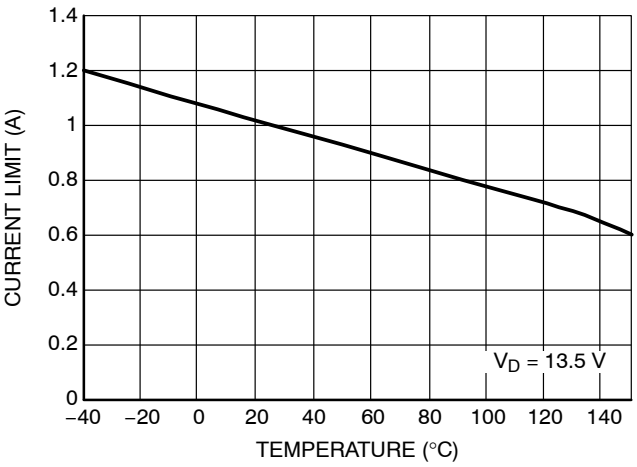


Figure 10. Current Limit vs. Temperature

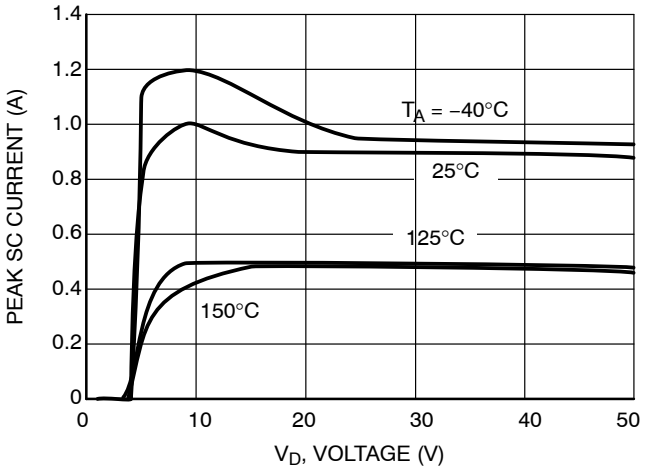


Figure 11. Peak Short Circuit Current vs. V_D Voltage

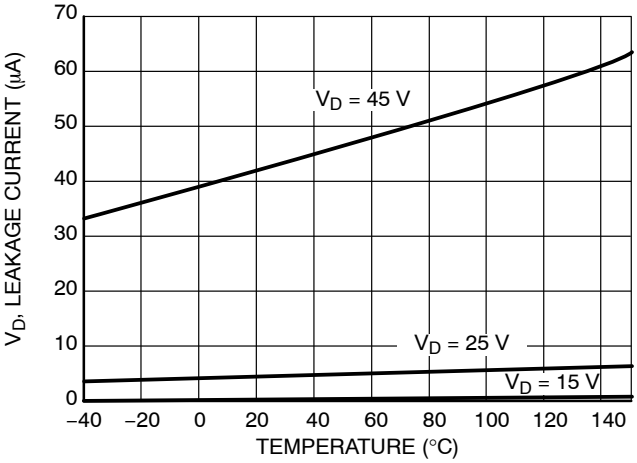


Figure 12. V_D Leakage Current vs. Temperature Off−State

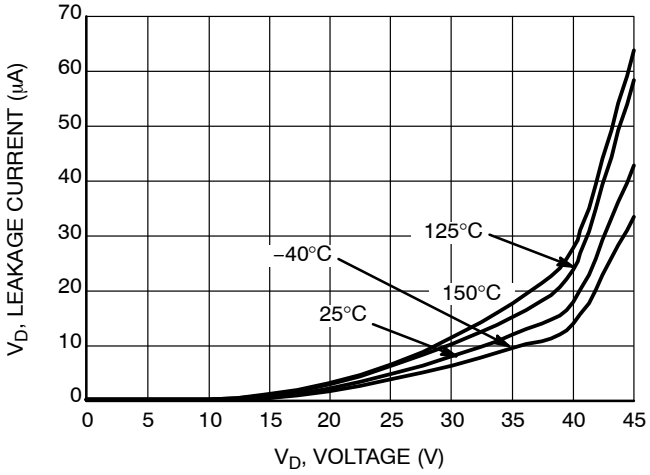


Figure 13. V_D Leakage Current vs. V_D Voltage Off−State

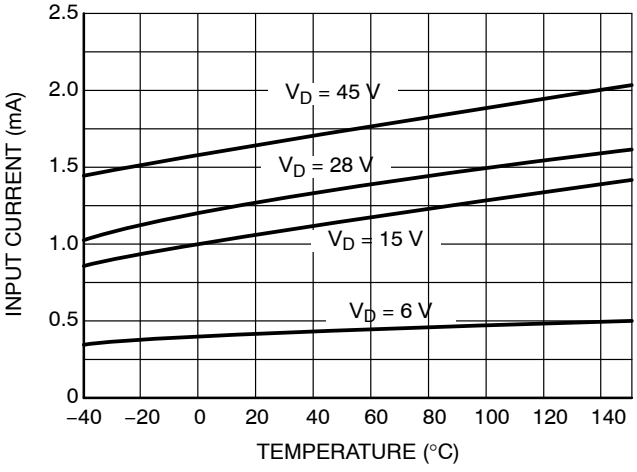


Figure 14. On−State Input Current vs. Temperature

TYPICAL CHARACTERISTIC CURVES

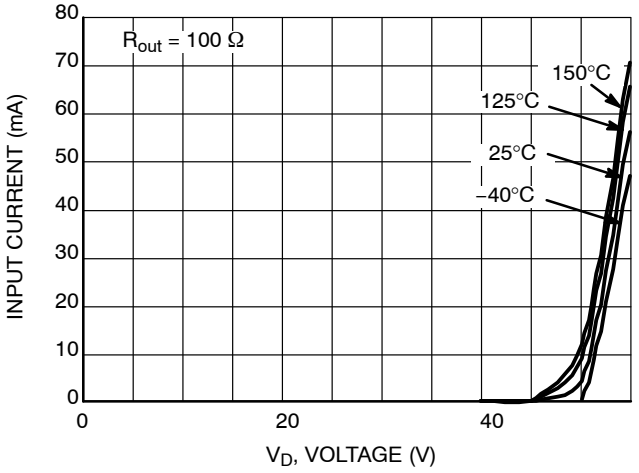


Figure 18. Input Current vs. V_D Voltage Off−State

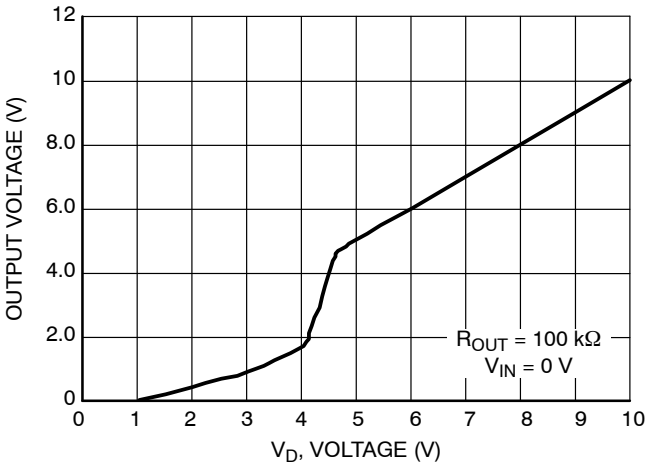


Figure 15. Output Voltage vs. V_D Voltage

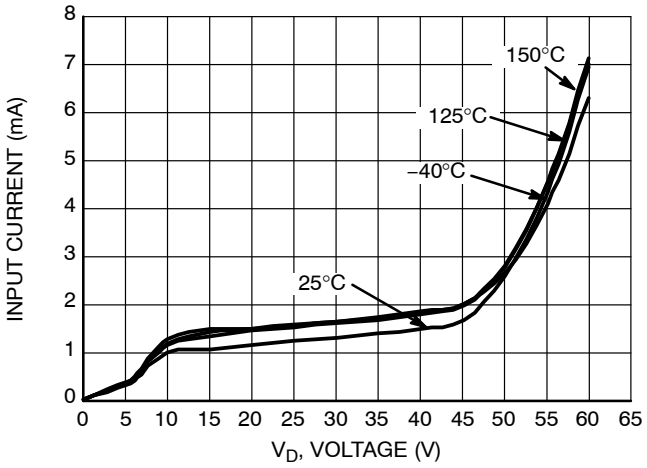


Figure 16. Input Current vs. V_D Voltage On−State

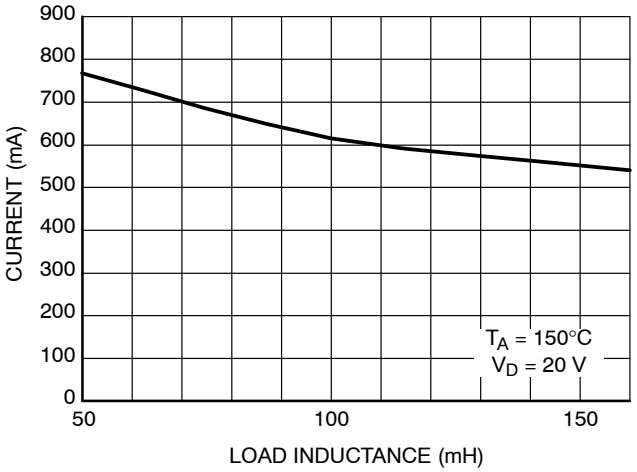


Figure 17. Single Pulse Maximum Switch−off Current vs. Load Inductance

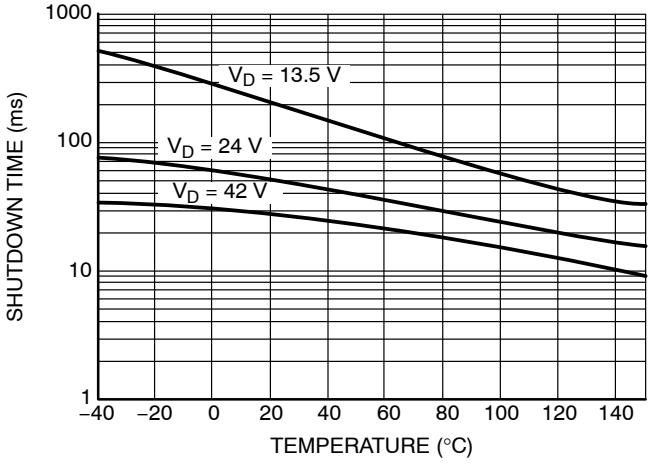


Figure 19. Initial Short−Circuit Shutdown Time vs. Temperature

TYPICAL CHARACTERISTIC CURVES

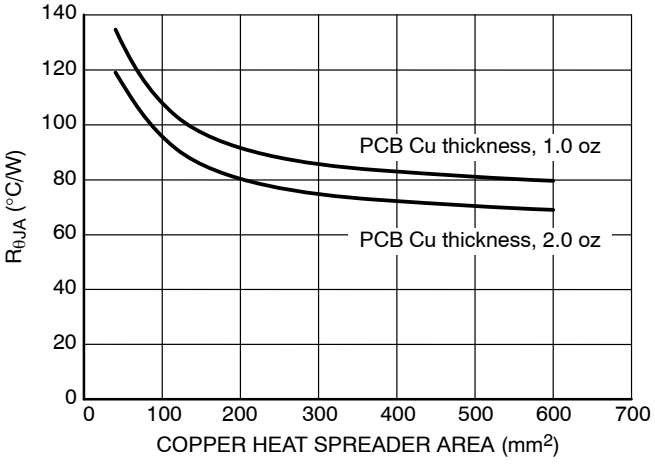


Figure 20. $R_{\theta JA}$ vs. Copper Area

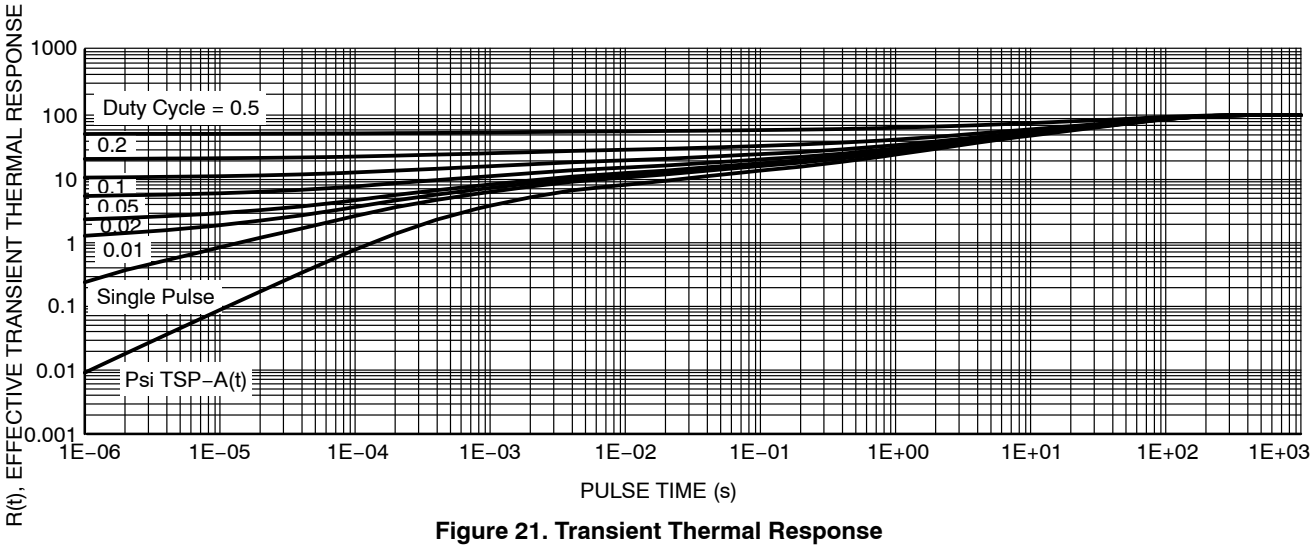


Figure 21. Transient Thermal Response

ISO PULSE TEST RESULTS

Test Pulse	Test Level	Test Results	Pulse Cycle Time and Generator Impedance
1	200 V	C	500 ms, 10 Ω
2	150 V	C	500 ms, 10 Ω
3a	200 V	C	100 ms, 50 Ω
3b	200 V	C	100 ms, 50 Ω
5	175 V	E(100 V)	400 ms, 2 Ω

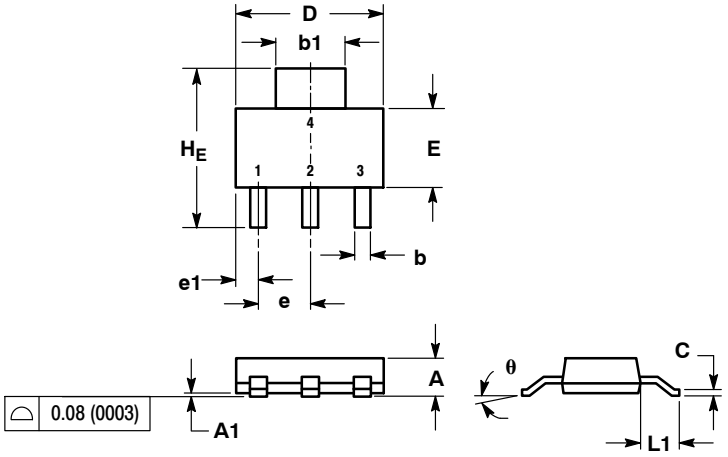
ORDERING INFORMATION

Device	Package	Shipping†
NCV8450STT3G	SOT−223 (Pb−Free)	4000 / Tape & Reel
NCV8450ASTT3G	SOT−223 (Pb−Free)	4000 / 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.

PACKAGE DIMENSIONS

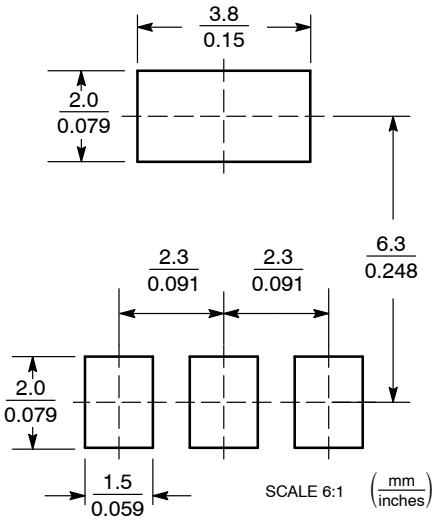
SOT−223 (TO−261)
CASE 318E−04
ISSUE M



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.63	1.75	0.060	0.064	0.068
A1	0.02	0.06	0.10	0.001	0.002	0.004
b	0.60	0.75	0.89	0.024	0.030	0.035
b1	2.90	3.06	3.20	0.115	0.121	0.126
c	0.24	0.29	0.35	0.009	0.012	0.014
D	6.30	6.50	6.70	0.249	0.256	0.263
E	3.30	3.50	3.70	0.130	0.138	0.145
e	2.20	2.30	2.40	0.087	0.091	0.094
e1	0.85	0.94	1.05	0.033	0.037	0.041
L1	1.50	1.75	2.00	0.060	0.069	0.078
H_E	6.70	7.00	7.30	0.264	0.276	0.287
θ	0°	–	10°	0°	–	10°

SOLDERING 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
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Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

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