NPS4053

5.5 V, 55 mΩ load switch with precision adjustable current limit

Rev. 2 — 20 October 2023 Product data sheet

1. General description

The NPS4053 is a 5.5 V, 55 mΩ load switch with precision adjustable current limit from 110 mA to 2.5 A.

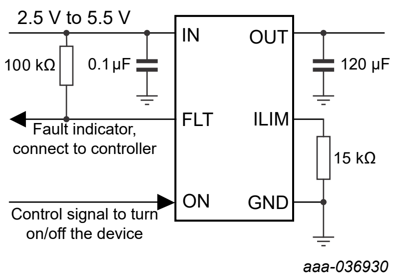
The NPS4053 switch limits the output current to a constant current by using a constant-current mode when the output load exceeds the current limit threshold or shorted. An internal voltage comparator disables the load switch when the output voltage is higher than the input to protect devices on the input side of the switch. The FLG pin is an active low output to indicate overcurrent, over temperature and reverse voltage conditions.

2. Features and benefits

- Input operating voltage range (V_{IN}): 2.5 V to 5.5 V
- Maximum continuous current (I_{MAX}): 2 A
- ON resistance ($R_{DS(on)}$):
  - V_{IN} = 5.5 V: 55 mΩ (typical)
  - V_{IN} = 3.6 V: 65 mΩ (typical)
  - V_{IN} = 2.5 V: 80 mΩ (typical)
- Adjustable current limit: 110 mA to 2.5 A
- ±6 % current limit accuracy at 1.2 A
- ILIM pin protection: can be shorted to ground or left floating
- Constant current during current limit
- No body diode when disabled (no current path from pin OUT to pin IN)
- Active reverse voltage protection
- Built in soft start
- UL 62368 recognition
- SOT457 (TSOP6) and SOT8044-1 (HWSON6) package option
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C2a exceeds 500 V
  - IEC 61000-4-2 contact discharge 8000 V
  - IEC 61000-4-2 air-gap discharge 15000 V
- Specified from -40 °C to +125 °C

3. Applications

- USB ports/hubs, laptops, docking station and desktops
- Set top box
- HDTV
- Optical socket protection
- Current limiting circuits



Note: Connect at least 120 µF capacitor at output for USB port application, other applications except USB choose output capacitor according to actual transient requirements.

Fig. 1. Typical application circuit

nexperia

4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
NPS4053GV	-40 °C to +125 °C	SC-74; TSOP6	plastic surface-mounted package; 6 leads	SOT457
NPS4053GH	-40 °C to +125 °C	HWSON6	plastic thermal enhanced very very thin Small Outline packages; no leads; 6 terminals; 0.65 mm pitch; 2.0 × 2.0 × 0.75 mm body	SOT8044-1

5. Marking

Table 2. Marking

Type number	Marking code
NPS4053GV	s3
NPS4053GH	s3

6. Functional diagram

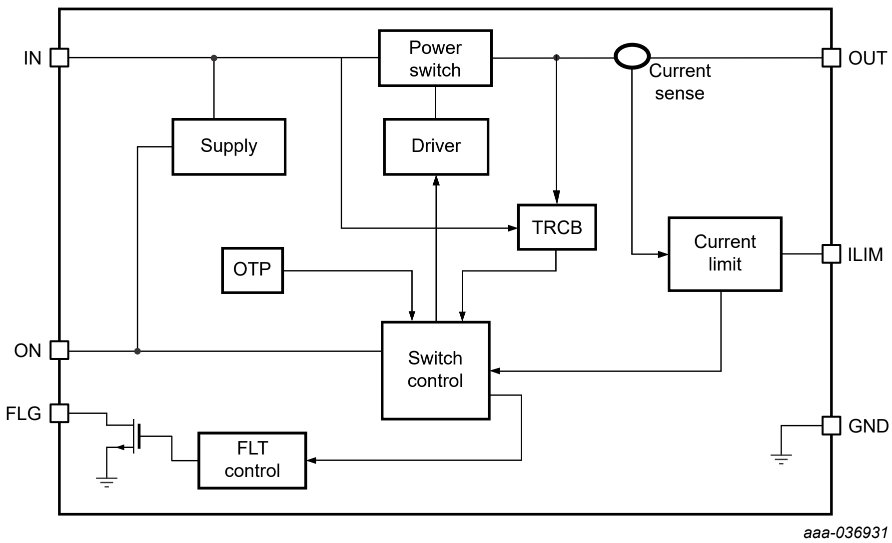
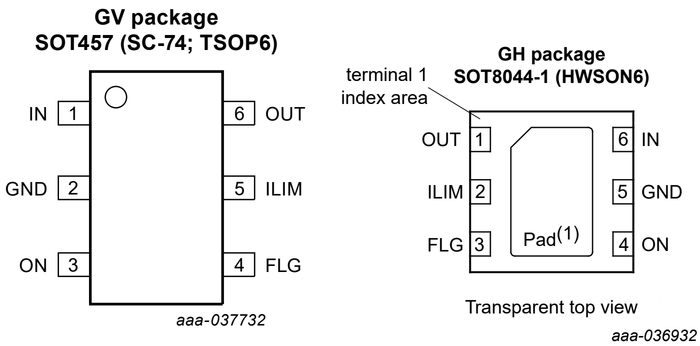


Fig. 2. Functional block diagram

7. Pinning information

7.1. Pinning



(1) This is not a supply pin. Thermal pad should be soldered to GND externally; used to heat-sink the device to the circuit board.

7.2. Pin description

Table 3. Pin description

Symbol	Pin		I/O	Description
	SOT8044-1	SOT457		
IN	6	1	Supply	Power-switch input pin. Connect a ceramic capacitor of minimal 0.1 μF from pin IN to GND, as close to the IC as possible.
GND	5	2	Supply	Ground connection; connect externally to PCB ground.
ON	4	3	I	ON/OFF (enable) input. LogicHIGH turns on power switch.
FLG	3	4	O	Active-low open-drain output, pulled up to VIN or other power rails via external resistor. Asserts low during overcurrent, overtemperature and reverse-voltage conditions. Can be shorted to GND or floating if not used.
ILIM	2	5	O	Connect external resistor between ILIM pin and GND to set current limit threshold.
OUT	1	6	O	Power-switch output pin. Connect at least 120 μF capacitor at output for USB port application. Choose output capacitor according to actual transient requirements for other applications other than USB.
PAD	-	-	-	Thermal pad should be soldered to GND externally; used to heat-sink the device to the circuit board

8. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V). [1]

Symbol	Parameter	Conditions	Min	Max	Unit
V_{IN}	input voltage	pin IN	-0.3	+6	V
V_{OUT}	output voltage	pin OUT	-0.3	+6	V
V_{ON}	ON/OFF (enable) input voltage	pin ON	-0.3	+6	V
V_{ILIM}	ILIM pin voltage	pin ILIM	-0.3	+6	V
V_{FLG}	FLG pin voltage	pin FLG	-0.3	+6	V

Symbol	Parameter	Conditions	Min	Max	Unit
V_{IN}-V_{OUT}	voltage range from pin IN to pin OUT		-6	+6	V
I_{FLG}	FLG pin sink current	pin FLG	0	25	mA
I_{ILIM}	ILIM pin source current	pin ILIM	0	1	mA
T_j	junction temperature		-40	+150	°C
T_{stg}	storage temperature		-65	+150	°C
ESD					
V_{ESD}	electrostatic discharge voltage	HBM ANSI/ESDA/JEDEC JS-001	-2	+2	kV
		CDM ANSI/ESDA/JEDEC JS-002	-0.5	+0.5	kV
		IEC 61000-4-2 contact discharge	-8	+8	kV
		IEC 61000-4-2 air-gap discharge	-15	+15	kV

[1] Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{IN}	input voltage	pin IN	2.2	5.5	V
V_{ON}	ON/OFF (enable) input voltage	pin ON	0	5.5	V
V_{IH}	HIGH-level input voltage	ON pin	1.4	-	V
V_{IL}	LOW-level input voltage	ON pin	0	0.35	V
I_{OUT}	continuous output current		0	2	A
R_{ILIM}	current-limit threshold resistor range (nominal 1%) from pin ILIM to GND		9.31	210	kΩ
I_{FLG}	continuous sink current pin FLG		0	10	mA
T_{amb}	ambient temperature		-40	+125	°C

10. Thermal Information

Table 6. Thermal information

Thermal resistance according JEDEC51 -5 and -7

Symbol	Parameter	Package		Unit
		SOT457 (SC-74; TSOP6)	SOT8044-1 (HWSON6)	
$R_{\theta JA}$	Junction to ambient thermal resistance	160	63.4	°C/W
$R_{\theta JC(top)}$	Junction to case(top) thermal resistance	132.1	98.2	°C/W
Φ_{JT}	Junction to top char parameter	21.1	5.8	°C/W
Φ_{JB}	Junction to board char parameter	37.1	33.1	°C/W

11. Static characteristics

Table 7. Static characteristics

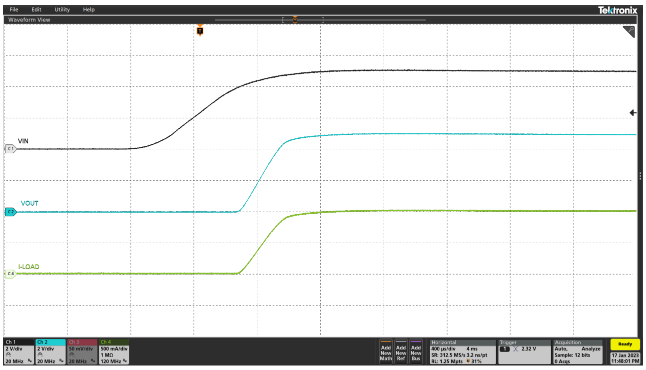
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

V_{IN} = 5 V, R_{FLG} = 100 kΩ, All typical values are measured at T_{amb} = 25 °C, unless otherwise specified.

Symbol	Parameter	Conditions	T_{amb} = -40 °C to +125 °C			Unit
			Min	Typ	Max	
POWER SWITCH						
$R_{DS(on)}$	drain-source on-state resistance	V_{IN}= 5.5 V	-	55	88	mΩ
		V_{IN}= 3.6 V	-	65	109	mΩ
		V_{IN}= 2.5 V	-	80	140	mΩ
t_r	rise time output	C_L = 1 µF; R_L = 100 Ω				
		V_{IN} = 5.5 V	-	0.3	1	ms
		V_{IN} = 2.5 V	-	0.2	1	ms
t_f	fall time output	C_L = 1 µF; R_L = 100 Ω				
		V_{IN} = 5.5 V	-	0.2	0.3	ms
		V_{IN} = 2.5 V	-	0.2	0.3	ms
ON/OFF INPUT						
I_{ON}	input current	V_{ON} = 0 V or 5.5 V	-0.5	-	0.5	uA
t_{on}	turn-on time	V_{IN}= 2.5 V to 5.5 V; C_L = 1 µF; R_L = 100 Ω	-	-	3	ms
t_{off}	turn-off time	V_{IN}=2.5 V to 5.5 V; C_L = 1 µF; R_L = 100 Ω	-	-	3	ms
I_{LIMIT}	current-limit threshold	V_{IN} - V_{OUT} = 1.0 V				
		R_{ILIM} = 9.31 kΩ; T_j ≤ 125 °C	2.25	2.5	2.72	A
		R_{ILIM} = 10.2 kΩ; T_j ≤ 125 °C	2.06	2.3	2.50	A
		R_{ILIM} = 12.7 kΩ; T_j ≤ 125 °C	1.68	1.85	2.01	A
		R_{ILIM} = 15.0 kΩ; T_j ≤ 125 °C	1.48	1.57	1.67	A
		R_{ILIM} = 20.0 kΩ; T_j ≤ 125 °C	1.09	1.18	1.25	A
		R_{ILIM} = 49.9 kΩ; T_j ≤ 125 °C	0.42	0.47	0.51	A
		R_{ILIM} = 210.0 kΩ; T_j ≤ 125 °C	0.08	0.11	0.14	A
		pin LIMIT shorted to GND	-	2.46	-	A
		pin LIMIT open	-	0.11	-	A
REVERSE VOLTAGE PROTECTION						
$V_{reverse}$	reverse-voltage comparator trip point		-	75	110	mV
$t_{reverse}$	time from reverse-voltage condition to MOSFET turn off	V_{IN} = 4 V; V_{OUT} = 5 V	-	0.5	5	µs
SUPPLY CURRENT						
I_q	quiescent current	V_{IN} = V_{ON}= 5.5 V; no load on pin OUT; R_{ILIM} = 20 kΩ	-	-	285	µA
I_{SD}	shut down current	V_{IN} = 5.5 V; no load on pin OUT, V_{ON} = 0 V; R_{ILIM} = 20 kΩ	-	-	1	µA
I_{REV}	reverse current leakage	V_{IN} = 0 V; V_{OUT} = 5.5 V	-	150	-	nA

Symbol	Parameter	Conditions	T_{amb} = -40 °C to +125 °C			Unit
			Min	Typ	Max	
UNDERVOLTAGE LOCKOUT						
V_{UVLO}	under voltage lockout low-level input voltage	V_{IN} rising	-	2.35	2.45	V
$V_{hys(UVLO)}$	undervoltage lockout hysteresis voltage	T_j = 25 °C	-	25	-	mV
FLG INDICATOR						
V_{OL}	LOW-level output voltage	I_{FLG} = 1 mA	-	-	180	mV
$I_{S(OFF)}$	OFF-state leakage current	V_{FLG} = 5.5 V	-	-	1	μA
t_{degl}	deglitch time	FLG assertion or de-assertion due to overcurrent condition	-	8.5	12	ms
		FLG assertion or de-assertion due to reverse-voltage condition	-	0.2	1	ms
THERMAL SHUTDOWN						
$T_{th(sd)}$	shutdown threshold temperature		155	-	-	ºC
$T_{sd(hys)}$	shutdown temperature hysteresis		-	10	-	ºC

11.1. Typical characteristics



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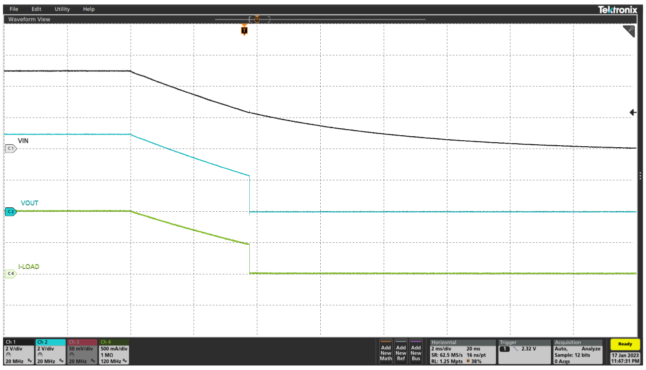
V_{IN}=5 V, C_{OUT} = 1 μF, R_{ILIM} = 20 KΩ, I_{load} = 1 A

Fig. 3. Turn ON



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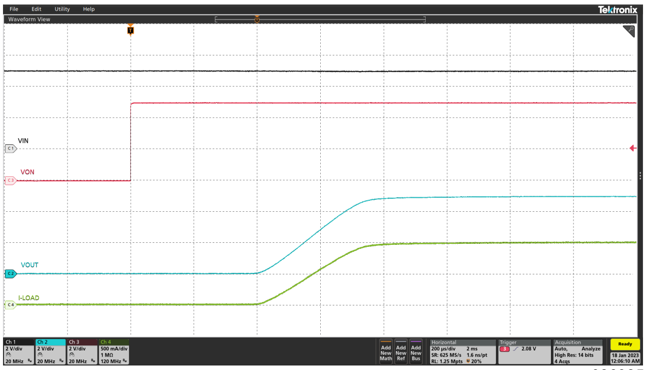
V_{IN}=5 V, C_{OUT} = 1 μF, R_{ILIM} = 20 KΩ, I_{load} = 1 A

Fig. 4. Turn OFF



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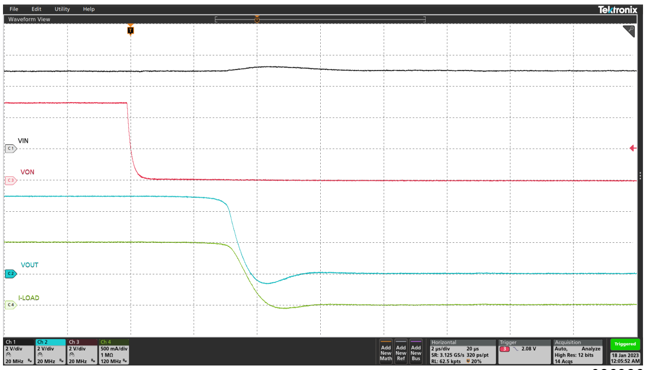
V_{IN}=5 V, V_{OUT}=5 V, C_{OUT} = 1 µF, R_{ILIM} = 20 KΩ, I_{load} = 1 A

Fig. 5. Enable



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V_{IN}=5 V, V_{OUT}=5 V, C_{OUT} = 1 µF, R_{ILIM} = 20 KΩ, I_{load} = 1 A

Fig. 6. Disable

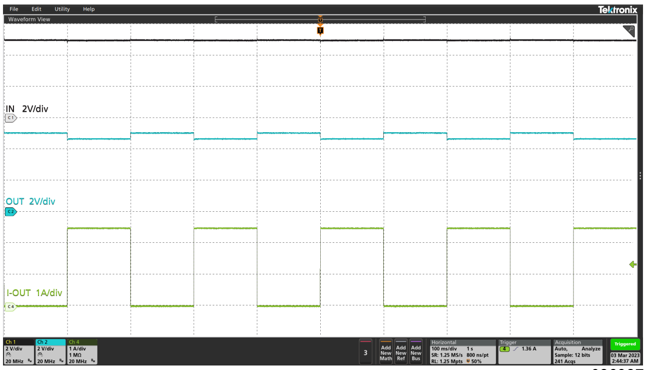

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Fig. 7. Load transient 0 A to 2.5 A

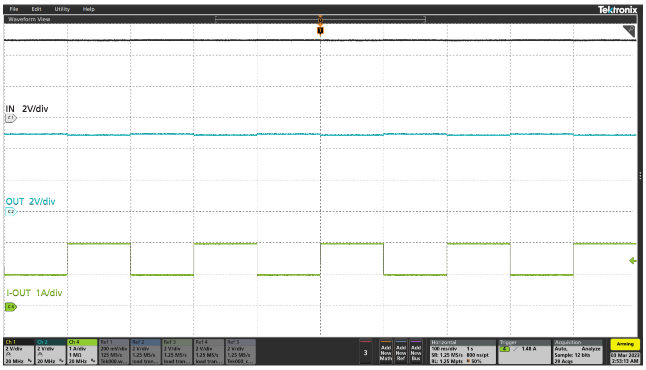

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Fig. 8. V_{IN} transient 1 A to 2 A

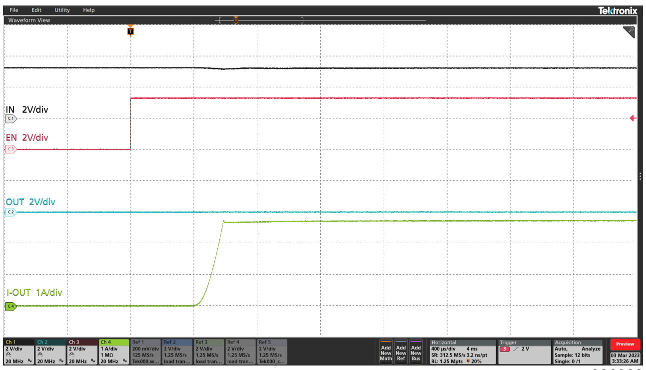

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Fig. 9. Enable to short

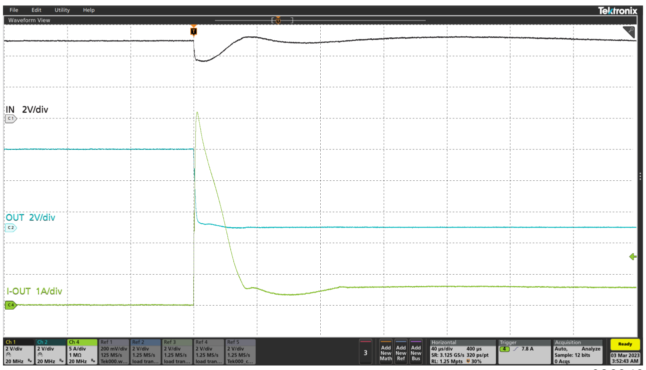

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Fig. 10. Hard short

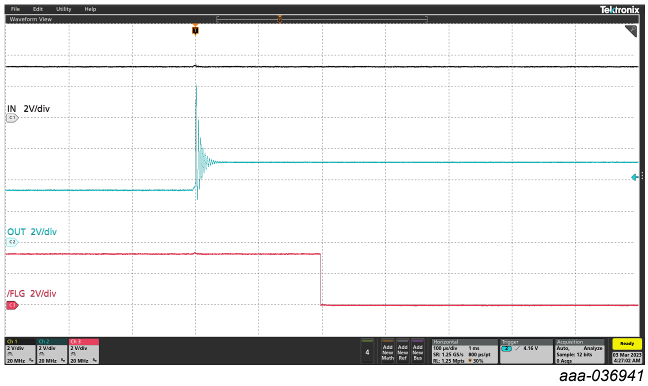


Fig. 11. Reverse voltage blocking

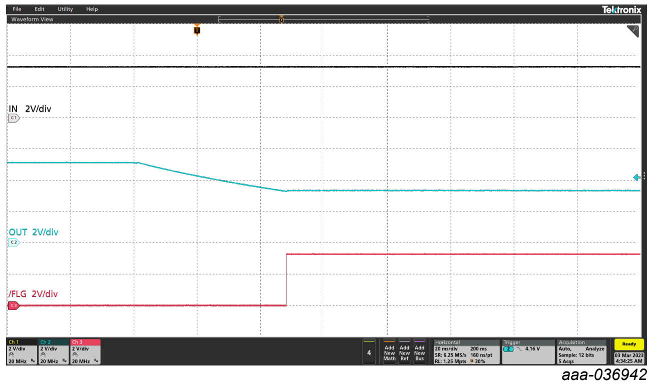
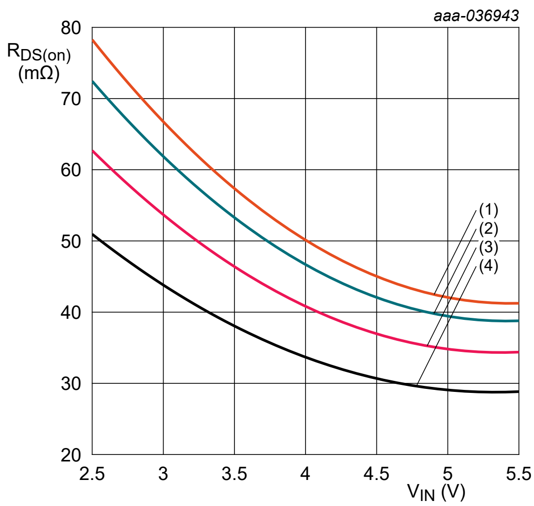
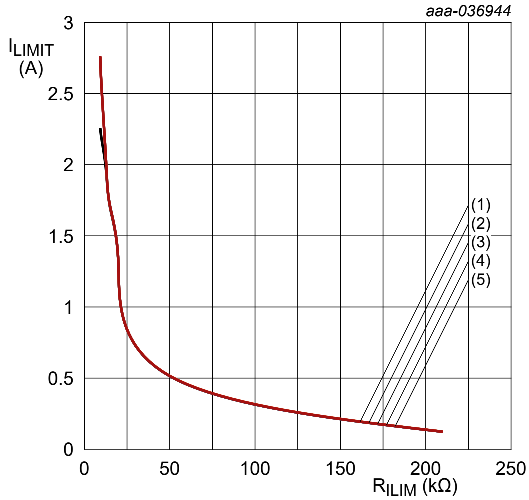


Fig. 12. Reverse voltage blocking



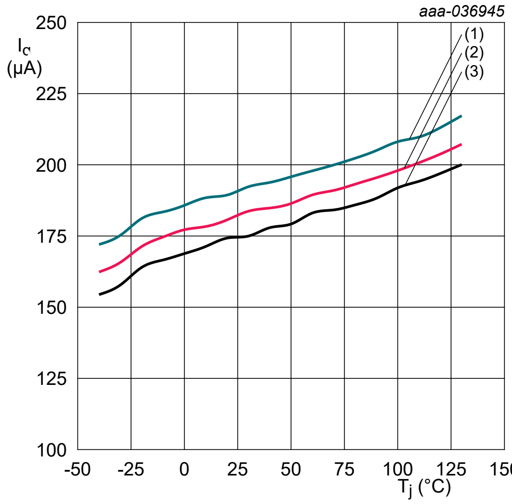
(1) T_{amb} = 125 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = -40 °C

Fig. 13. $R_{DS(on)}$ vs V_{IN}



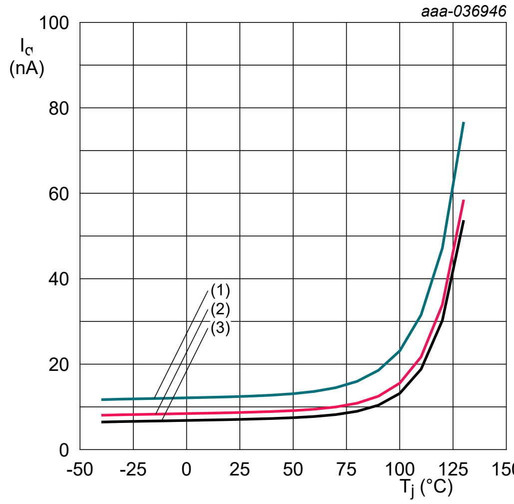
(1) V_{IN} = 2.5 V
(2) V_{IN} = 3.3 V
(3) V_{IN} = 3.6 V
(4) V_{IN} = 5.0 V
(5) V_{IN} = 5.5 V

Fig. 14. Current limit vs R_{ILIM}



(1) V_{IN} = 5.0 V
(2) V_{IN} = 3.3 V
(3) V_{IN} = 2.5 V

Fig. 15. Supply current (output enabled)



(1) V_{IN} = 5.0 V
(2) V_{IN} = 3.3 V
(3) V_{IN} = 2.5 V

Fig. 16. Supply current (output disabled)

12. Functional description

12.1. Overview

The NPS4053 is a 5.5 V, 55 mΩ P-channel load switch with overcurrent, overtemperature and active reverse voltage protections. The NPS4053 allows users to program the current limit threshold between 110 mA and 2.5 A using an external resistor.

The NPS4053 has built in soft-start functionality and controls the rising and falling times of the output voltage to limit large current and voltage surges. Additional features include overtemperature protection and active reverse-voltage protection.

NPS4053 enters constant-current limit when the load exceeds the current limit threshold.

12.1.1. Functional block diagram

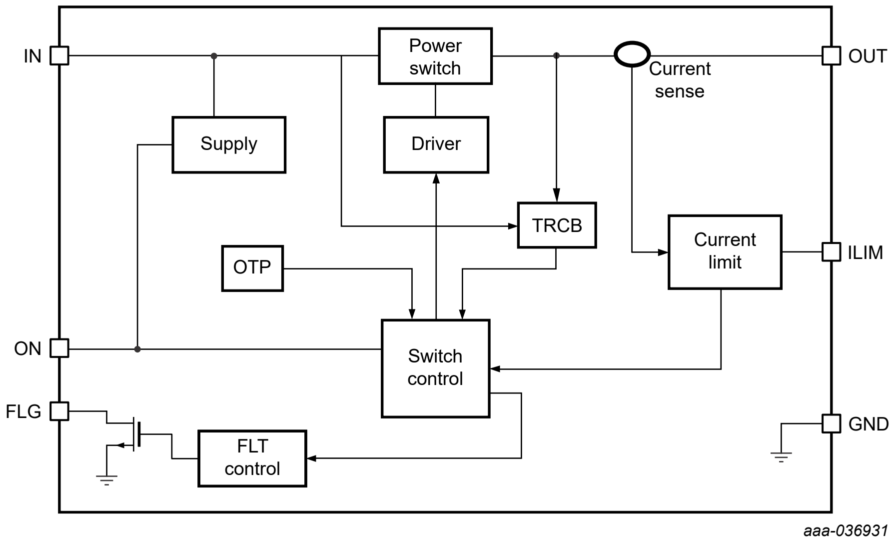


Fig. 17. Functional block diagram

12.2. Feature description

12.2.1. Overcurrent protection

When the load current exceeds current limit threshold set by the external resistor, the NPS4053 enters constant current mode by limiting the output current to the current limit threshold until the overcurrent condition is removed, FLG pin asserts if the overcurrent condition persists for 8.5 ms.

12.2.2. Output short circuit protection (I_{LIMIT})

When the switch is turned on while the output pin is shorted to ground, the NPS4053 enters constant current mode immediately and limits the output current to I_{LIMIT} (see Fig. 18) until the short circuit condition is removed. When the output pin is shorted to ground while the switch is fully turned on, a large current will flow through the switch. The switch responses to short-circuit condition within the time t_{SC} (see Fig. 19). Like previous case, NPS4053 limits the output current to I_{LIMIT} until the short circuit condition is removed.

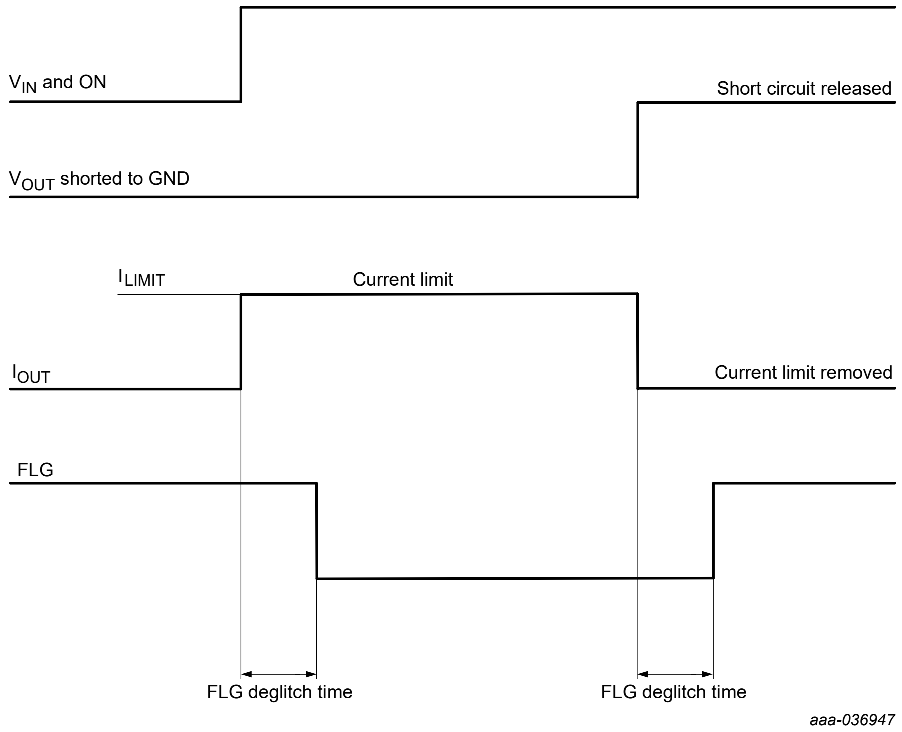


Fig. 18. Power on to short circuit

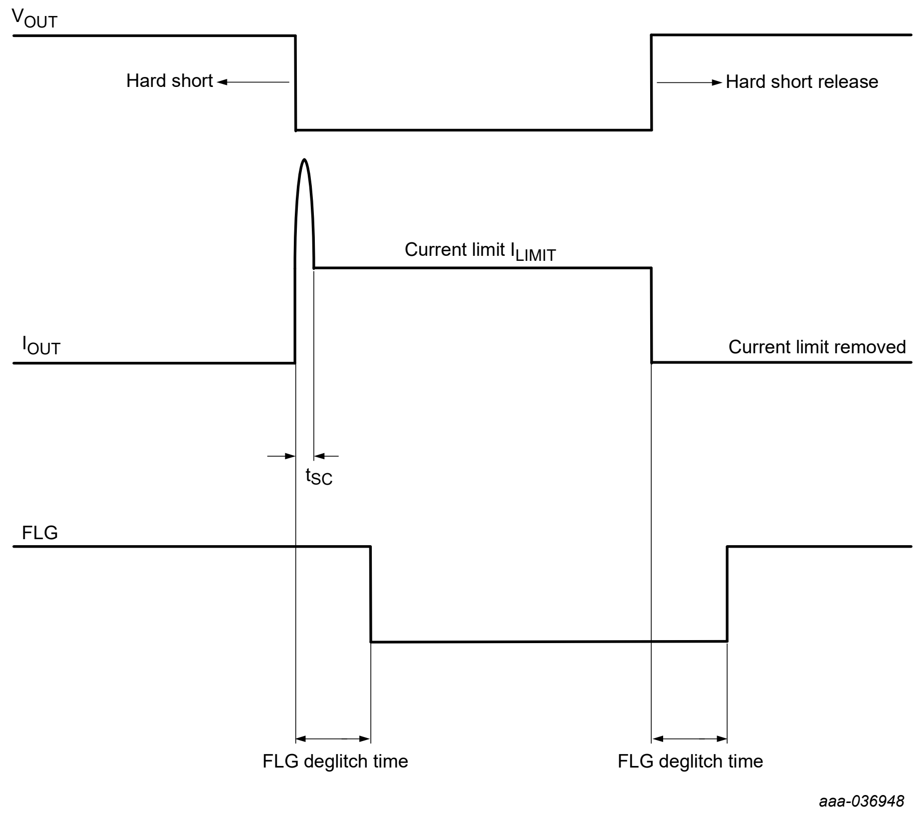


Fig. 19. Hot short

12.2.3. ILIM pin protection

As ILIM pin is used to configure the current limit threshold with an external resistor, it's performance of current limiting will be impacted once the ILIM pin is shorted to ground or is floating. NPS4053 provides ILIM pin protection: ILIM pin can be shorted to ground or left floating. Load current is limited by internal current limit circuit under the two circumstances. Users can leave ILIM pin shorted to ground or left floating in actual applications to save system cost.

12.2.4. Overtemperature protection

The NPS4053 thermal cycles if an over current condition is present long enough to activate thermal Limit in any of the above cases. The switch turns off when the junction temperature exceeds 155 °C (typical). The switch remains off until the junction temperature cools 10 °C (typical) and then restarts (see Fig. 20). FLG pin asserts immediately when the junction temperature exceeds 155 °C.

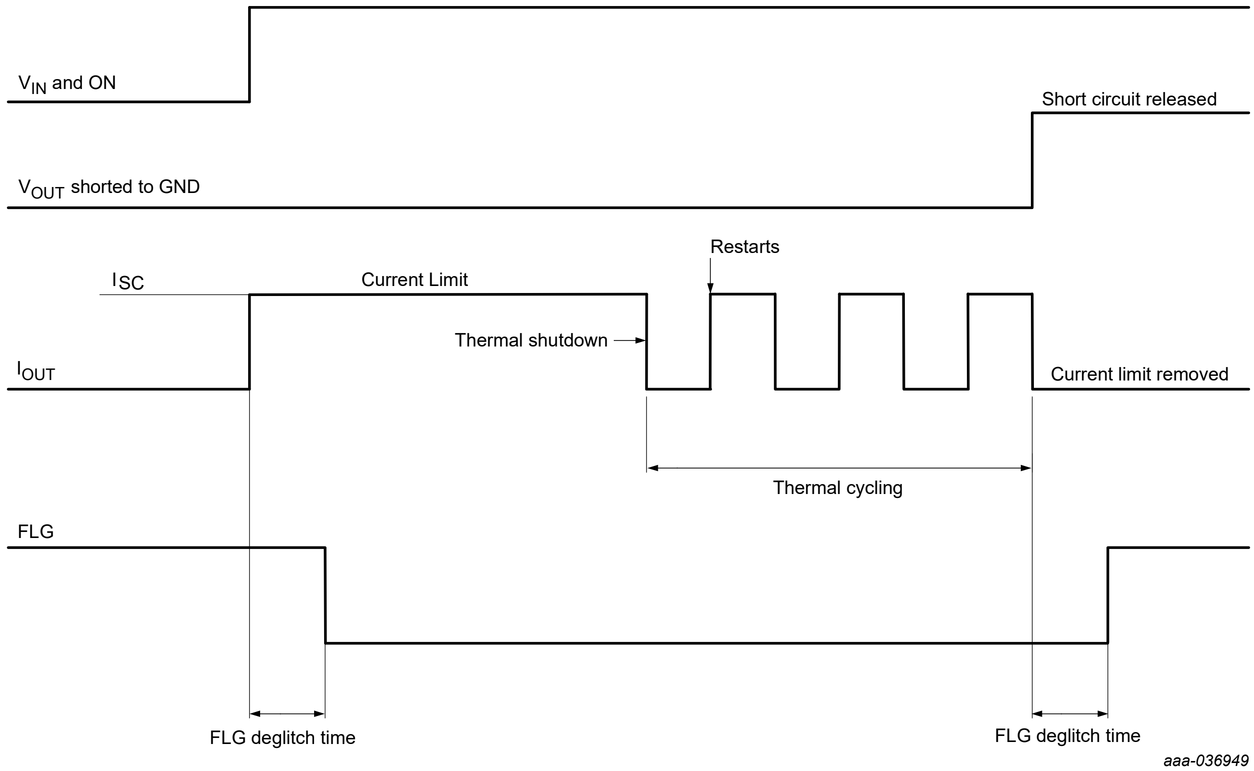


Fig. 20. Power on to short circuit until thermal shutdown

12.2.5. Reverse voltage protection

The NPS4053 integrates active reverse voltage protection. The switch turns off internal MOSFET whenever the output voltage exceeds the input voltage by 75 mV for 0.5 µs. The NPS4053 switch turns on once the reverse voltage condition is removed (see Fig. 21). FLG pin will assert low 0.2 ms after reverse voltage condition and de-assert after reverse voltage condition is removed.

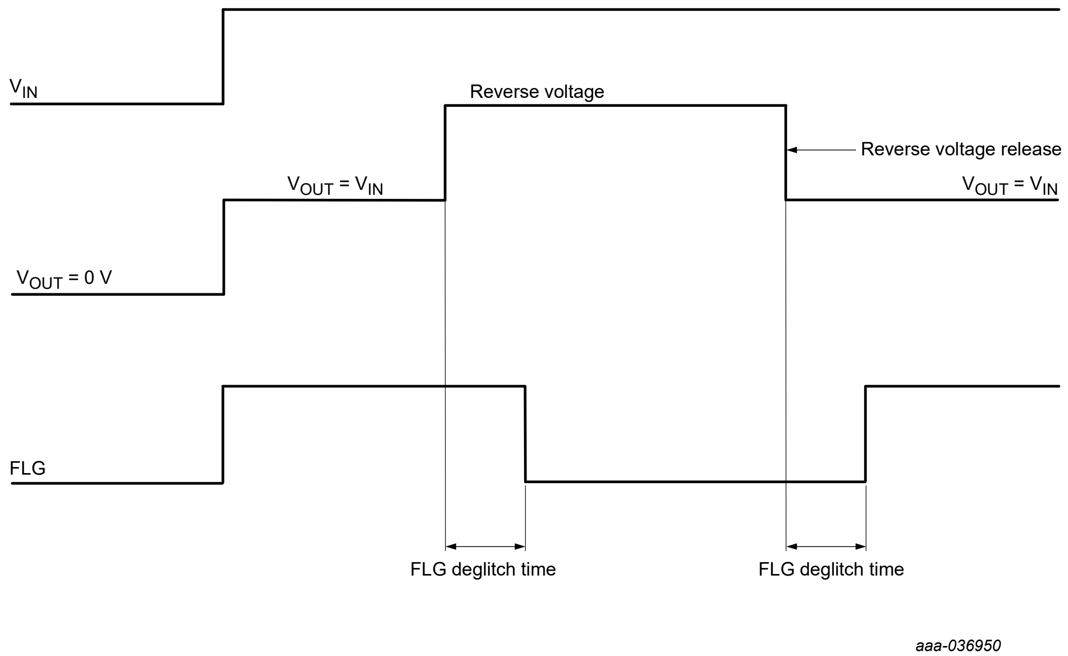


Fig. 21. Reverse voltage protection

12.2.6. FAULT flag response

Fault flag (pin FLG) output is an N-MOS open drain output. FLG pin is asserted low during overcurrent, overtemperature and reverse voltage conditions. An internal deglitch circuit is designed to eliminate false FLG reporting. Deglitch time for over current is 8.5 ms and that for reverse voltage is 0.2 ms. FLG pin voltage goes low 8.5 ms after over current and goes high 8.5 ms after over current condition is removed (see Fig. 18). FLG pin voltage goes low 0.2 ms after reverse voltage and goes high 0.2 ms after reverse voltage condition is removed (see Fig. 21). Overtemperature condition is not deglitched and asserts the FLG signal immediately when the junction temperature exceeds 155 °C. FLG pin can be shorted to ground or left floating when not used.

12.2.7. Undervoltage lockout (UVLO)

The undervoltage lockout (UVLO) circuit prevents the power switch from turning on until input voltage reaches the UVLO turn on threshold. Hysteresis is also built in to present unwanted on and off cycling due to input voltage drop from large current surges.

12.2.8. Enable (ON)

The logic enable (pin ON) circuit controls the power switch, a logic high enables the internal MOSFET. The enable input is compatible with both TTL and CMOS logic levels. The enable circuit also provides power to other circuits to reduce the supply current. The power supply current is reduced to less than 1 µA when a logic low is present on ON pin.

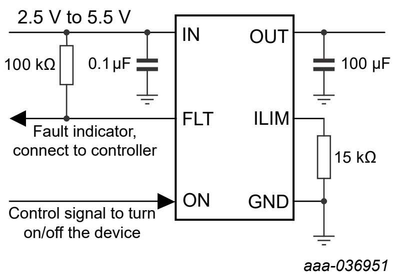
12.2.9. Adjustable current limit threshold

NPS4053 can change current limit threshold from 110 mA to 2.5 A by connecting an external resistor between ILIM pin and GND. The resistor value is required to be between 9.31 KΩ to 210 kΩ (1 % tolerance) to ensure the stability of the internal regulation loop. The relationship between external resistor and current limit threshold is shown in equation below:

$$I_{ILIM}\ (mA) = \frac{23600\ (V)}{R_{ILIM}\ (k\Omega)}$$

13. Application information

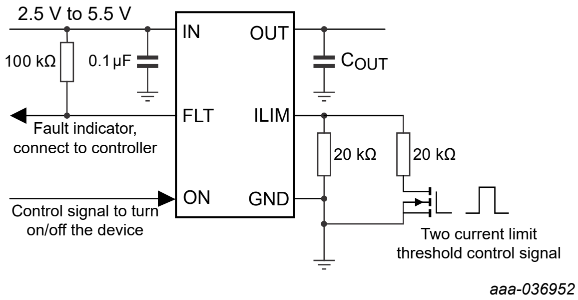
13.1. One-level current limit application



V_{IN} = 2.5 V to 5.5 V; V_{OUT} = 2.5 V to 5.5 V; current limitation = 1.57 A

Fig. 22. One-level current limit circuit

13.2. Two-level current limit circuit



V_{IN} = 2.5 V to 5.5 V; V_{OUT} = 2.5 V to 5.5 V;
current limitation 1 = 1.18 A;
current limitation 2 = 2.36 A

Fig. 23. Two-level current limit circuit

13.3. Auto-retry configuration

NPS4053 switch limits the output current to a safe level by using a constant-current mode when the output load exceeds the current limit threshold or shorted. Constant-current version can be configured as auto-retry version via external resistor and capacitor as Fig. 24 shows. When over current occurs, FLG pin will be pulled low. Since ON pin is tied to FLG pin, ON pin will also be pulled low thus disable the load switch. The over current condition will not exist once the switch is turned off so the FLG pin and ON pin voltage will go high and the switch will be turn on again. ON/OFF time will be determined by RC time constant. An actual test result can be found in Fig. 25.

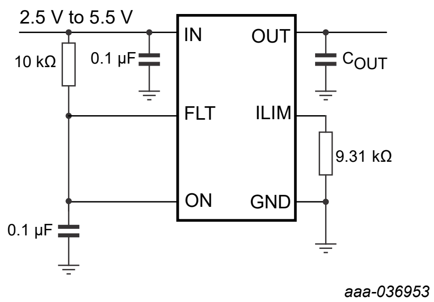


Fig. 24. Auto-retry configuration circuit

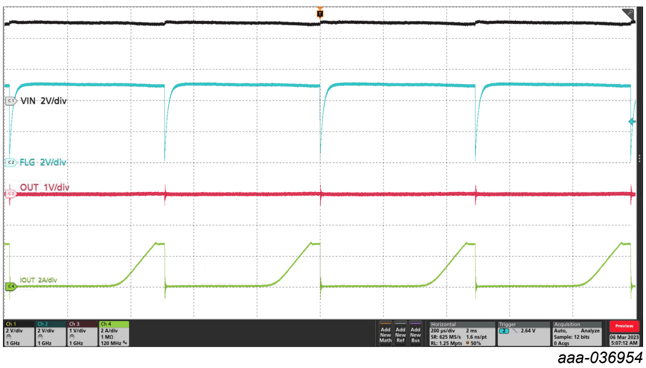


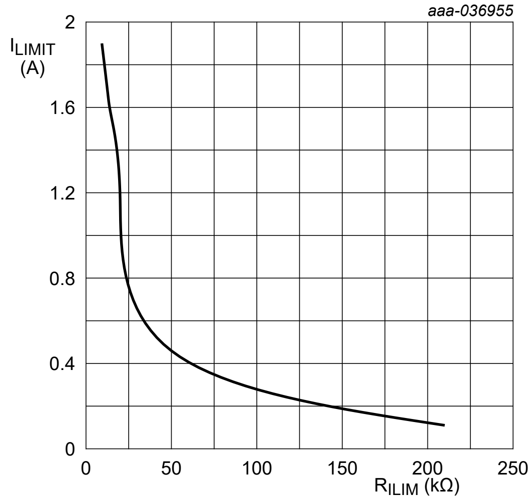
Fig. 25. Auto-retry test result

13.4. Programming the current limit threshold via a resistor

The NPS4053 is capable of adjusting the current limit threshold via an external resistor placed between the ILIM pin and ground. The NPS4053 uses an internal regulation loop to provide a regulated voltage on the ILIM pin. The NPS4053 offers short circuit and open protection on the ILIM pin to prevent damage to the device if the ILIM pin is not properly configured. The recommended 1% resistor range for R_{ILIM} is 9.31 kΩ ≤ R_{ILIM} ≤ 210 kΩ to ensure stability of the internal regulation loop. The following tables and charts provide information about how the R_{ILIM} resistor affect the current limit threshold (I_{LIMIT}) at specific input voltages.

Table 8. Current limit threshold at V_{IN} = 2.5 V

V_{IN} = 2.5 V; T_{amb} = 25 °C	
R_{ILIM} resistance connected between pin ILIM and GND (kΩ)	I_{LIMIT} current limit threshold (A)
9.31	1.9
10.2	1.84
12.7	1.67
15	1.55
20	1.17
49.9	0.46
210	0.11

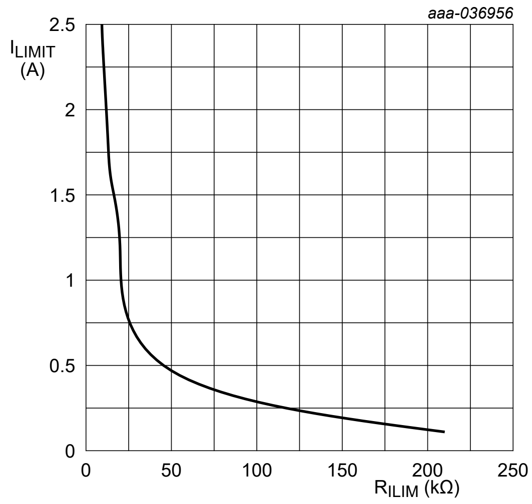


V_{IN} = 2.5 V; T_{amb} = 25 °C

Fig. 26. Current limit threshold vs R_{ILIM}

Table 9. Current limit threshold at V_{IN} = 3.3 V

V_{IN} = 3.3 V; T_{amb} = 25 °C	
R_{ILIM} resistance connected between pin ILIM and GND (kΩ)	I_{LIMIT} current limit threshold (A)
9.31	2.5
10.2	2.3
12.7	1.85
15	1.57
20	1.17
49.9	0.47
210	0.11

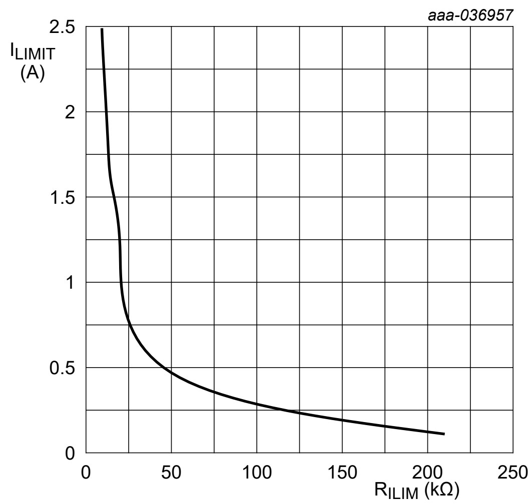


V_{IN} = 3.3 V; T_{amb} = 25 °C

Fig. 27. Current limit threshold vs R_{ILIM}

Table 10. Current limit threshold at V_{IN} = 5 V

V_{IN} = 5 V; T_{amb} = 25 °C	
R_{ILIM} resistance connected between pin ILIM and GND (kΩ)	**I_{LIMIT} current limit threshold (A)**
9.31	2.49
10.2	2.3
12.7	1.85
15	1.57
20	1.18
49.9	0.47
210	0.11



V_{IN} = 5 V; T_{amb} = 25 °C

Fig. 28. Current limit threshold vs R_{ILIM}

14. Layout

14.1. Power supply recommendations

The NPS4053 is designed to operate with a V_{IN} range of 2.5 V to 5.5 V. The V_{IN} power supply must be well regulated and placed as close to the device terminal as possible. The power supply must be able to withstand all transient load current steps. In most situations, using an input capacitance (C_{IN}) of 1 μF is sufficient to prevent the supply voltage from dipping when the switch is turned on. In cases where the power supply is slow to respond to a large transient current or large load current step, additional bulk capacitance may be required on the input.

14.2. Layout guidelines

For best performance, all traces must be as short as possible. To be most effective, the input and output capacitors must be placed close to the device to minimize the effects that parasitic trace inductances may have on normal operation. Using wide traces for V_{IN}, V_{OUT}, and GND helps minimize the parasitic electrical effects.

14.3. Layout example

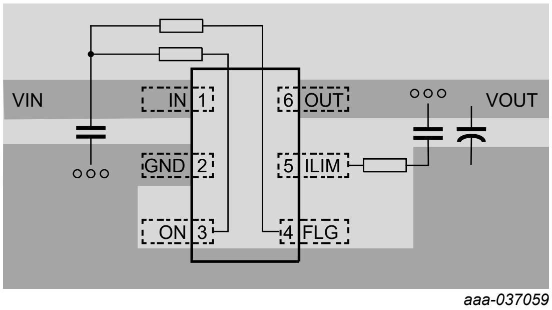


Fig. 29. NPS4053 layout example (SOT457)

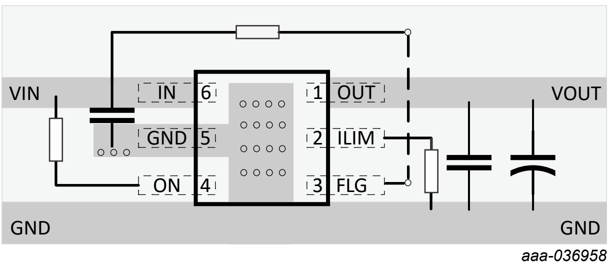


Fig. 30. NPS4053 layout example (SOT8044-1)

15. Thermal considerations

The maximum IC junction temperature should be restricted to 125 °C under normal operating conditions. To calculate the maximum allowable dissipation, $P_{D(max)}$ for a given output current and ambient temperature, the equation as shown below can be used:

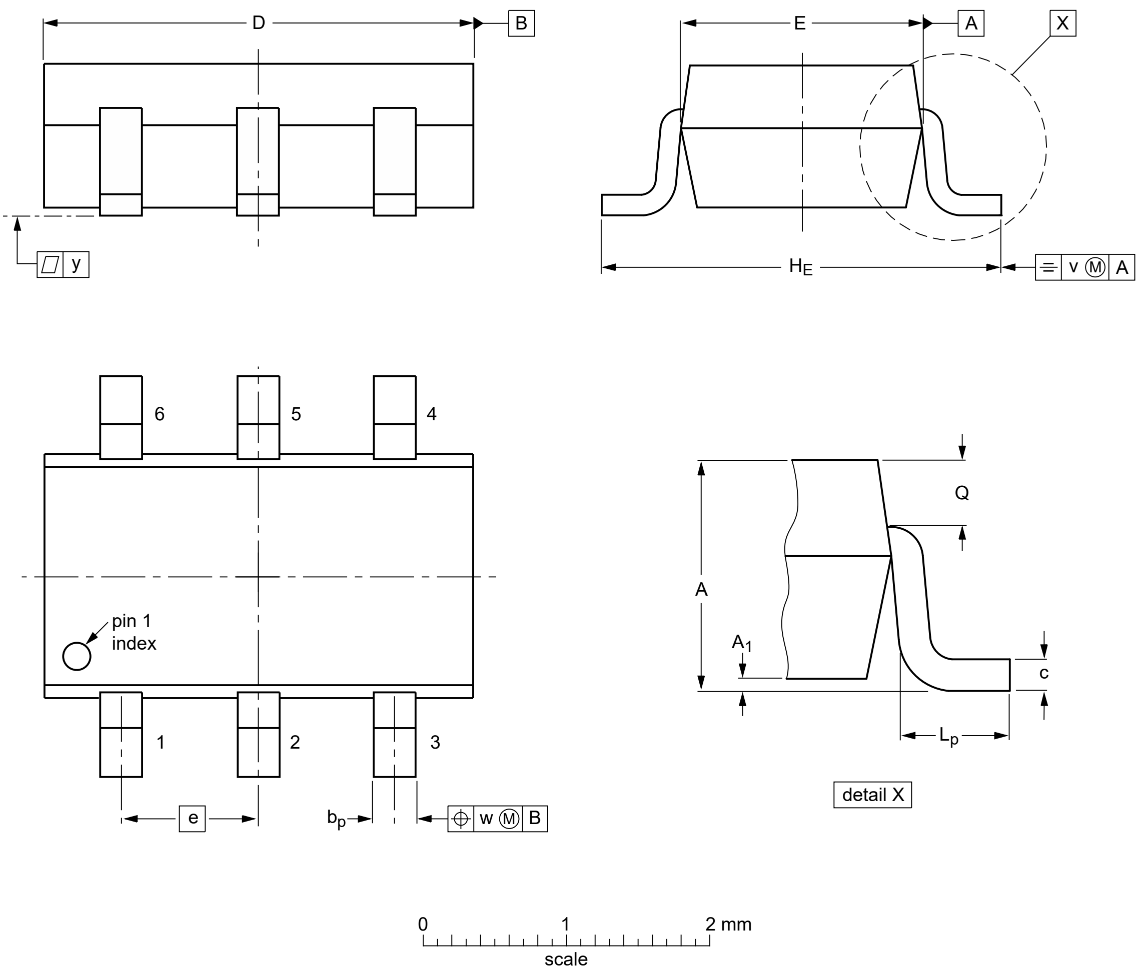
$$P_{\mathrm{D(MAX)}} = \frac{T_{\mathrm{J(MAX)}} - T_{\mathrm{amb}}}{\theta_{\mathrm{JA}}}$$

Where:

$P_{D(MAX)}$ = maximum allowable power dissipation
$T_{J(MAX)}$ = maximum allowable junction temperature (125 °C for the NPS4053 devices)
T_{amb} = ambient temperature of the device
θ_{JA} = junction to air thermal impedance. This parameter is highly dependent upon board layout.

16. Package outline

Plastic, surface-mounted package (SC-74; TSOP6); 6 leads **SOT457**



Dimensions (mm are the original dimensions)

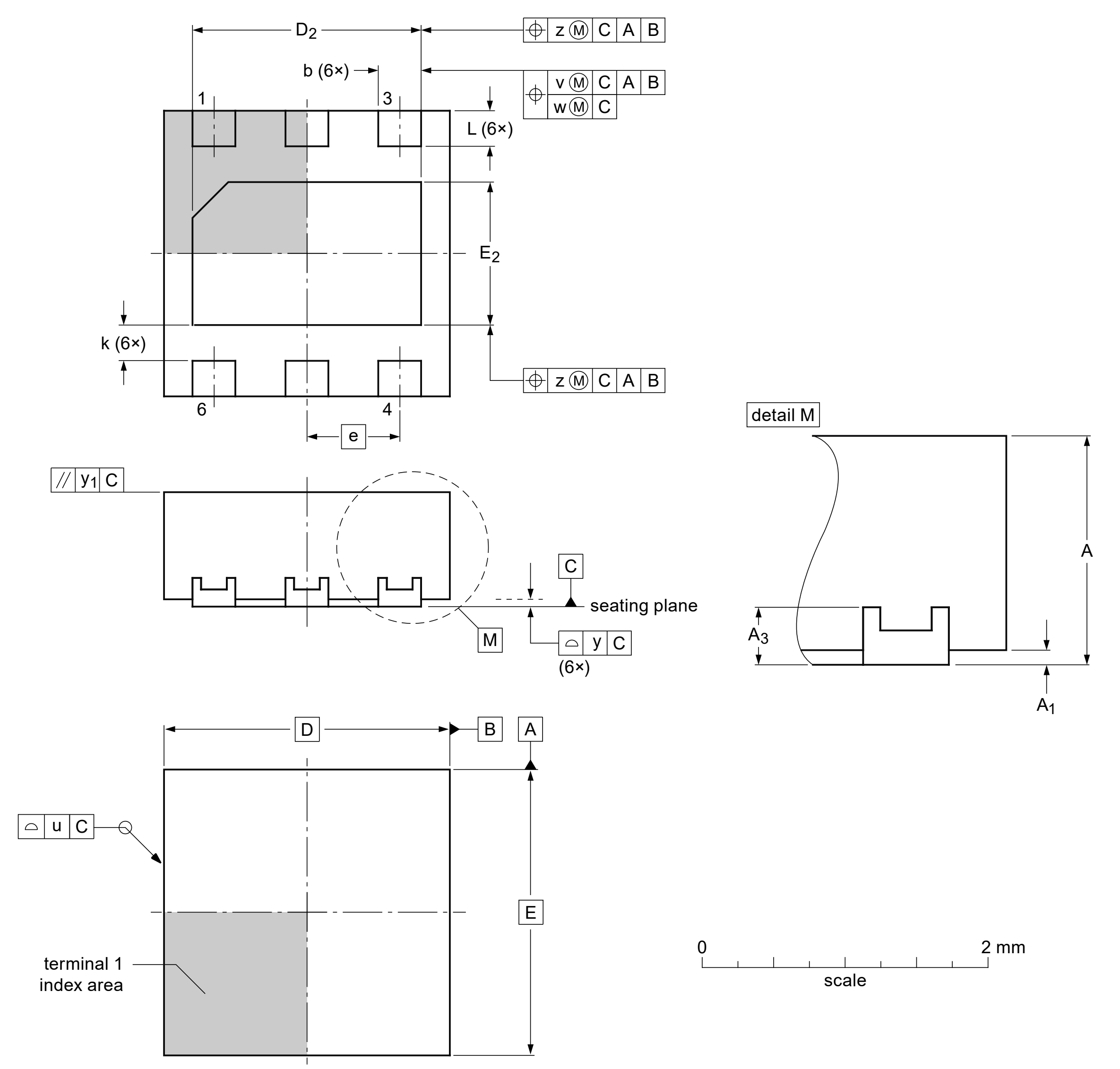
Unit		A	A_1	b_p	c	D	E	e	H_E	L_p	Q	v	w	y
mm	max	1.1	0.1	0.40	0.26	3.1	1.7		3.0	0.6	0.33			
	nom							0.95				0.2	0.2	0.1
	min	0.9	0.013	0.25	0.10	2.7	1.3		2.5	0.2	0.23			

sot457_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT457			SC-74			~~06-03-16~~ 18-11-27

Fig. 31. Package outline SOT457 (SC-74; TSOP6)

HWSON6: plastic thermal enhanced very very thin Small Outline packages, no leads; 6 terminals; 0.65 mm pitch; 2.0 mm x 2.0 mm x 0.75 mm body **SOT8044-1**



Dimensions (mm are the original dimensions)

Unit		A	A1	A3	b	D	D2	E	E2	e	k	L	u	v	w	y	y1	z
	max	0.80	0.05		0.35		1.70		1.10			0.30						
mm	nom	0.75		0.2 Ref.	0.30	2.00 BSC	1.60	2.00 BSC	1.00	0.65 BSC	0.25 Ref.	0.25	0.05	0.10	0.05	0.05	0.05	0.10
	min	0.70	0.00		0.25		1.50		0.90			0.20						

sot8044-1_po

Outline version	References: IEC	References: JEDEC	References: JEITA		European projection	Issue date
SOT8044-1		MO-229				~~22-06-15~~ 23-05-25

Fig. 32. Package outline SOT8044-1 (HWSON6)

17. Abbreviations

Table 11. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
TTL	Transistor-Transistor Logic

18. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NPS4053 v.2	20231020	Product data sheet	-	NPS4053 v.1
Modifications:	• Added type number NPS4053GV (SOT457/SC-74; TSOP6) • Table 7: typical output rise time at V_{IN} = 2.5 V changed to 0.2 ms.			
NPS4053 v.1	20230629	Product data sheet	-	-

19. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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