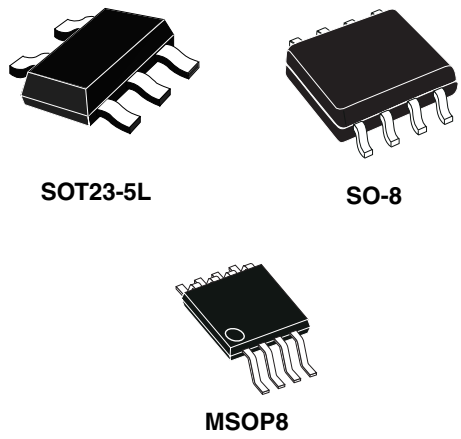
# STMPS2141, STMPS2151
# STMPS2161, STMPS2171

## Enhanced single channel power switches

## Features

- 90 mΩ high-side MOSFET switch
- 500/1000 mA continuous current
- Thermal and short-circuit protection with overcurrent logic output
- Operating range from 2.7 V to 5.5 V
- CMOS- and TTL-compatible enable inputs
- Undervoltage lockout (UVLO)
- 12 µA maximum standby supply current
- Ambient temperature range, -40°C to 85°C
- 8 kV ESD protection
- Reverse current protection
- Fault-blanking




## Description

The STMPS2141, STMPS2151, STMPS2161, STMPS2171 power distribution switches are intended for applications where heavy capacitive loads and short circuits are likely to be encountered. These devices incorporate 90 mΩ N-channel MOSFET high-side power switches for power-distribution. These switches are controlled by a logic enable input.

When the output load exceeds the current-limit threshold or a short is present, the device limits the output current to a safe level by switching into a constant-current mode. When continuous heavy overloads and short circuits increase the power dissipation in the switch, causing the junction temperature to rise, a thermal protection circuit shuts the switch off to prevent damage. Recovery from a thermal shutdown is automatic once the device has cooled sufficiently. Internal circuitry ensures the switch remains off until a valid input voltage is present.

**Table 1. Device summary**

| Order codes | | | Current limit (mA) | Enable |
|---|---|---|---|---|
| SO-8 | SOT23-5L | MSOP8[1] | | |
| STMPS2141MTR | STMPS2141STR | STMPS2141TTR | 500 | Active low |
| STMPS2151MTR | STMPS2151STR | STMPS2151TTR | 500 | Active high |
| STMPS2161MTR | STMPS2161STR | STMPS2161TTR | 1000 | Active low |
| STMPS2171MTR | STMPS2171STR | STMPS2171TTR | 1000 | Active high |

1. MSOP8 package is also known as “TSSOP8”

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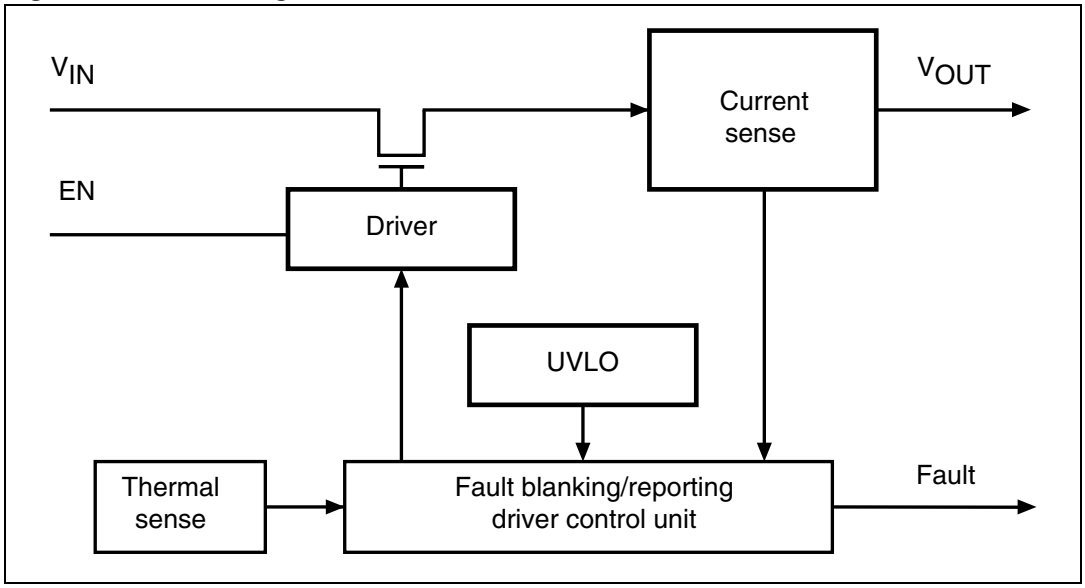
# 1 Block diagram

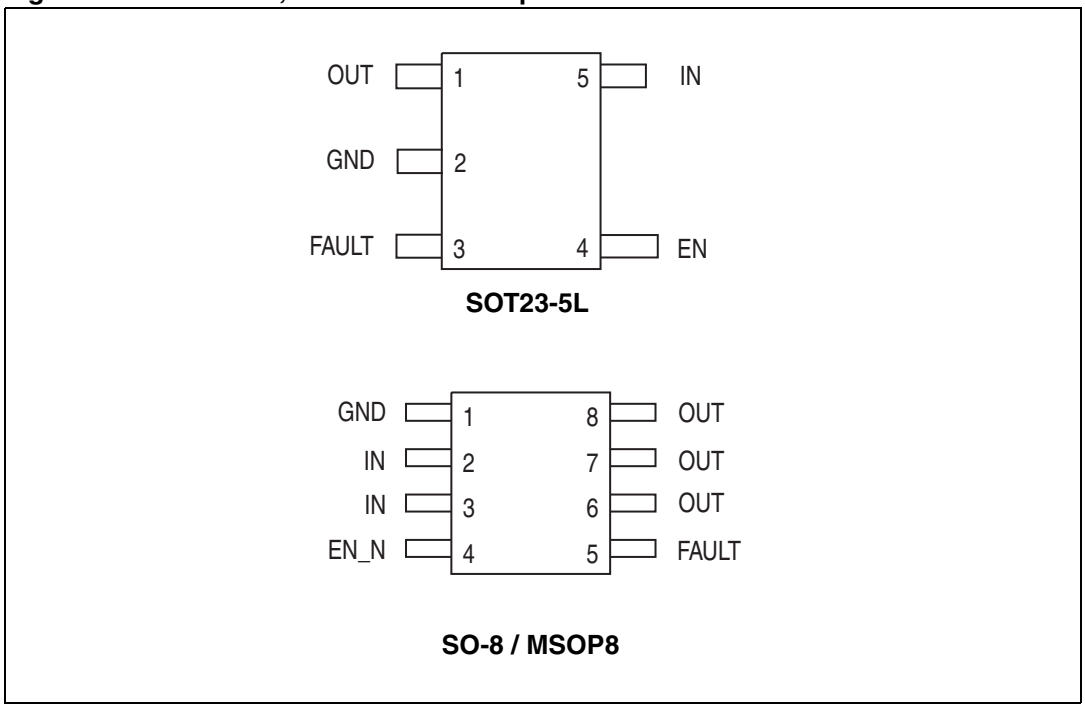
**Figure 1. Block diagram**



# 2 Pin settings

## 2.1 Pin connections

**Figure 2. SOT23-5L, SO-8 and MSOP8 pin connections**




## 2.2 Pin description

**Table 2. Pin description**

| Pin number | | | Name | Function |
|---|---|---|---|---|
| SO8 | MSOP8 | SOT23-5L | | |
| 1 | 1 | 2 | GND | Ground |
| 2 | 2 | 5 | IN | 2.7 V - 5.5 V input |
| 3 | 3 | - | IN | 2.7 V - 5.5 V input |
| 4 | 4 | 4 | EN | Enable for power switch |
| 5 | 5 | 3 | FAULT | Open drain FAULT indicator, active low |
| 6 | 6 | 1 | OUT | Output of power switch |
| 7 | 7 | - | OUT | Output of power switch |
| 8 | 8 | - | OUT | Output of power switch |

# 3 Functional description

## 3.1 Fault blanking

The STMPS devices feature a 10 ms fault blanking. Fault blanking allows current-limit faults, including momentary short-circuit faults that occur when hot-swapping a capacitive load, and also ensures that no fault is issued during power-up. When a load transient causes the device to enter current limit, an internal counter starts. If the load fault persists beyond the 10 ms fault-blanking timeout, the FAULT output asserts “low”. Load-transient faults less than 10 ms (typ.) do not cause a FAULT output assertion. Only current-limit faults are blanked. Die over-temperature faults and input voltage drops below the UVLO threshold cause an immediate fault output.

## 3.2 Overcurrent/over-temperature protection

In overcurrent or short-circuit condition, the switch limits the current at a value of about 120% of the rated current. If the temperature of the die goes above the limit value, the switch turns off.

## 3.3 FAULT conditions

In applications of power switch, 3 types of FAULT conditions are common. These fault conditions and the response of STMPS21x1 power switches are described in the following table.

**Table 3. FAULT conditions**

| Fault | Condition | STMPS21x1 action |
|---|---|---|
| Short circuit | Output shorted to GND via resistance path of < 1 Ω, causing a rapid current surge | Turn off output until short is removed, assert FAULT pin |
| Over-current | Output connected to a load that sinks current above threshold | Reduces output voltage to reduce the current. Assert FAULT pin after a blanking period |
| Overheating | Temperature of junction exceeds 135°C due to any reason | Turn OFF output until temperature falls below 125°C. Asserts FAULT pin immediately |

## 3.4 Reversed current blocking

When the switch is OFF, or when the STMPS device is un-powered ($V_{CC}$ = 0V), the switch behaves as an Hi-Z at the output pin, ensuring that no reverse current will flow into the device.

*Note: In the case where the switch is ON, and a voltage higher than $V_{IN}$ is applied to the OUT pin, a reverse current occurs. This operating condition is not allowed.*

## 3.5 UVLO

When input voltage drops below critical value, the power switch turns off to prevent improper operation due to low voltage.

# 4 Ambient temperature

In Enable operating mode, an amount of power is dissipated as heat in the power switch due to the on-resistance. The power dissipation is: $P = I^2R$

**Table 4. SOT23-5L (160 °C/W)**

| Part number | Max current | Max $R_{ON}$ at 5 V | Power dissipation | Temperature difference (Junction and Ambient) | Maximum ambient temperature (at Junction temperature 125 °C) |
|---|---|---|---|---|---|
| STMPS2141 | 0.50 A | 130 mΩ | 32.5 mW | 6.2 | 118.8 |
| STMPS2151 | | | | | |
| STMPS2161 | 1.00 A | 130 mΩ | 130.0 mW | 24.8 | 100.2 |
| STMPS2171 | | | | | |

**Table 5. MSOP8 (220 °C/W)**

| Part number | Max current | Max $R_{ON}$ at 5 V | Power dissipation | Temperature difference (Junction and Ambient) | Maximum ambient temperature (at Junction temperature 125 °C) |
|---|---|---|---|---|---|
| STMPS2141 | 0.50 A | 130 mΩ | 32.5 mW | 7.2 | 117.8 |
| STMPS2151 | | | | | |
| STMPS2161 | 1.00 A | 130 mΩ | 130.0 mW | 28.6 | 96.4 |
| STMPS2171 | | | | | |

**Table 6. SO-8 (160 °C/W)**

| Part number | Max current | Max $R_{ON}$ at 5V | Power dissipation | Temperature difference (Junction and Ambient) | Maximum ambient temperature (at Junction temperature 125 °C) |
|---|---|---|---|---|---|
| STMPS2141 | 0.50 A | 130 mΩ | 32.5 mΩ | 5.2 | 124.8 |
| STMPS2151 | | | | | |
| STMPS2161 | 1.00 A | 130 mΩ | 130.0 mΩ | 20.8 | 104.2 |
| STMPS2171 | | | | | |

# 5 Maximum rating

Stressing the device above the rating listed in the “Absolute Maximum Ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the Operating sections of this specification is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics SURE Program and other relevant quality documents.

## 5.1 Absolute maximum rating

**Table 7. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_I$ | Input voltage range | –0.3 – 6.0 | V |
| $V_O$ | Output voltage range | –0.3 – (Vi+0.3) | V |
| $V_{IENX}$ | EN Input voltage range | -0.3 – 6.0 | V |
| $I_O$ | Continuous output current | Internally limited | |
| ESD | ESD protection level | 8 | kV |
| $T_J$ | Junction operating temperature | –40 to 125 | °C |
| $T_{STG}$ | Storage temperature | –55 to 150 | °C |
| $T_R$ | Thermal resistance (MSOP8) | 220 | °C/W |
| $T_R$ | Thermal resistance (SOT23-5L) | 191 | °C/W |
| $T_R$ | Thermal resistance (SO-8) | 160 | °C/W |

## 5.2 Recommended operating conditions

**Table 8. Recommended operating conditions**

| Symbol | Parameter | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| $V_I$ | Input voltage | 2.7 | 5.0 | 5.5 | V |
| $V_O$ | Output voltage | 0 | 5.0 | 5.5 | V |
| $I_O$ (STMPS2141 STMPS2151) | Continuous output current | 0 | - | 500 | mA |
| $I_O$ (STMPS2161 STMPS2171) | Continuous output current | 0 | - | 1000 | mA |

# 6 Electrical specification

**Table 9. SOT-23-5L electrical characteristics**

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Rds on | Static drain source ON state resistance SOT23-5L package load = 500 mA (STMPS2141/ STMPS2151) load = 1000 mA (STMPS2161/ STMPS2171) | VI = 2.7 V ; TJ = 25°C; | | 120 | 160 | mΩ |
| | | VI = 5.0 V ; TJ = 25°C; | | 90 | 110 | mΩ |
| Rds on | Static drain source ON state resistance | VI = 2.7 V ; - 40 < TJ < 125°C | | | 200 | mΩ |
| | | VI = 5.0 V ; - 40 < TJ < 125°C | | | 135 | |
| Tr | Output rise time | VI = 5.0 V RL = 10 Ω CL = 1 µF | 0.05 | | 2 | mS |

**Table 10. MSO8P/SO8 electrical characteristics**

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Rds on | Static drain source ON state resistance SO-8 and MSO8 package load = 500 mA (STMPS2141/ STMPS2151) load = 1000 mA (STMPS2161/ STMPS2171) | VI = 2.7 V ; TJ = 25°C; | | 130 | 170 | mΩ |
| | | VI = 5.0 V ; TJ = 25°C; | | 110 | 125 | mΩ |
| Rds on | Static drain source ON state resistance | VI = 2.7 V ; - 40 < TJ < 125°C | | | 200 | mΩ |
| | | VI = 5.0 V ; - 40 < TJ < 125°C | | | 140 | |
| Tr | Output rise time | VI = 5.0 V RL = 10 Ω CL = 1 µF | 0.05 | | 2 | mS |

**Table 11. Current limit characteristics**
($V_I$ = 5.5 V, $I_O$ = rated current, $T_J$ = 25°C, unless otherwise specified)

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $I_{OS}$ (STMPS2141 STMPS2151) | Overcurrent limiting threshold | $V_I$ = 5 V<br>$V_{OUT}$ = 4.5 V | 0.60 | 0.80 | 1.00 | A |
| $I_{OS}$ (STMPS2161 STMPS2171) | Overcurrent limiting threshold | | 1.10 | 1.50 | 1.90 | A |
| $I_{OS}$ (2141,2151) | Short circuit output current | $V_I$ = 5 V, OUT connected to GND, device enabled into short circuit | | | 0.9 | A |
| $I_{OS}$ (2161,2171) | Short circuit output current | | | | 1.8 | A |

**Table 12. Supply current characteristics**
($V_I$ = 5.5 V, $I_O$ = rated current, $T_J$ = 25°C, unless otherwise specified)

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $I_{off}$ | Switch turned off | No load | | 6.0 | 12 | µA |
| | | No load;<br>-40 < $T_J$ < 125°C | | | 15 | |
| $I_{on}$ | Switch turned on | No load | | 40 | 60 | µA |
| | | No load;<br>-40 < $T_J$ < 125°C | | | 70 | |
| $I_{leakage}$ | Output leakage current (1) | Output grounded, switch is OFF | | | 2 | µA |
| | | Output grounded, switch is OFF;<br>-40 < $T_J$ < 125°C | | | 5 | |
| $I_{reverse}$ | Reversed leakage current | Input grounded, Output connected to 5.5 V, 25°C | | 0.5 | 2 | µA |
| | | Input grounded, Output connected to 5.5 V, 125°C | | 0.5 | 3 | |

1. $I_{leakage} = I_{off\text{-}ground} - I_{off}$, where $I_{off\text{-}ground}$ = current into Vin when switch is off and output is grounded

**Table 13. Thermal characteristics**
($V_I$ = 5.5 V, $I_O$ = rated current, $T_J$ = 25°C, unless otherwise specified)

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| T1 | Thermal shutdown threshold | | | | 145 | °C |
| T2 | Recovery from thermal shutdown | | 120 | | | °C |
| Hysteresis | | | | 14 | | °C |

**Table 14. UVLO characteristics**
($V_I$ = 5.5 V, $I_O$ = rated current, $T_J$ = 25°C, unless otherwise specified)

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $V_{UVLO}$ | Undervoltage lockout threshold | | 2.0 | | 2.5 | V |
| Hysteresis | | | 40 | 75 | 110 | mV |

**Table 15. OC pin characteristics**
($V_I$ = 5.5 V, $I_O$ = rated current, $T_J$ = 25°C, unless otherwise specified)

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| OC Blanking | OCx assertion and de-assertion | | 4 | 8 | 15 | ms |
| $V_O$ | Output low voltage | $I_O$ = 5 mA | | | 0.4 | V |
| $I_{OFF}$ | Off current | $V_{OC}$ = 2.7 V, 5.5 V (No OC Condition) | | | 1.0 | µA |

**Table 16. EN pin characteristics**
($V_I$ = 5.5 V, $I_O$ = rated current, $T_J$ = 25°C, unless otherwise specified)

| Symbol | Parameter | Test condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $V_{IH}$ | High level input voltage | $V_I$ = 2.7 V to 5.5 V | 2.0 | | | V |
| $V_{IL}$ | Low level input voltage | $V_I$ = 4.5 V to 5.5 V | | | 0.8 | V |
| | | $V_I$ = 2.7 V to 4.5 V | | | 0.4 | V |
| $I_I$ | Input current | $V_{IENX}$ = 0 V or $V_I$ | -0.5 | | 0.5 | uA |
| $t_{ON}$ | Turn-ON time(1) | $R_L$ = 10 Ω, $C_L$ = 100 mF | | | 5 | ms |
| $t_{OFF}$ | Turn-OFF time (1) | $R_L$ = 10 Ω, $C_L$ = 100 mF | | | 10 | ms |

1. Not tested in production, specified by design

# 7 Detail device characteristics

## 7.1 STMPS2141, STMPS2151 additional electrical charts

### 7.1.1 Turn on/off characteristics at $V_{OUT}$ = 5.0 V

**Figure 3. Voltage output turn on delay time**

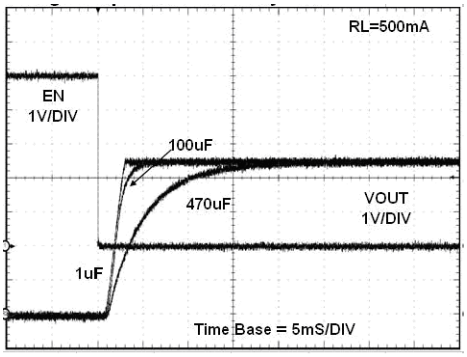



**Figure 4. Voltage output turn off delay time**

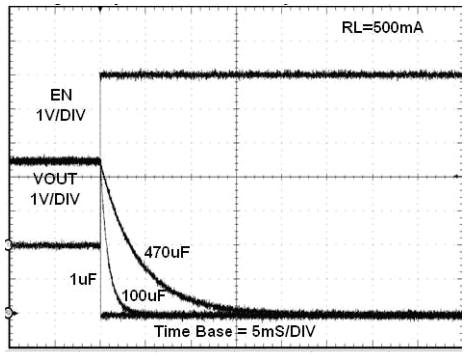



**Figure 5. Current output turn on delay time**

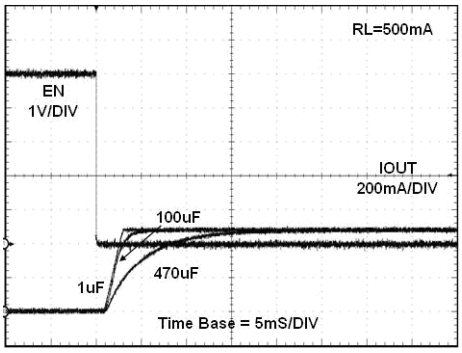
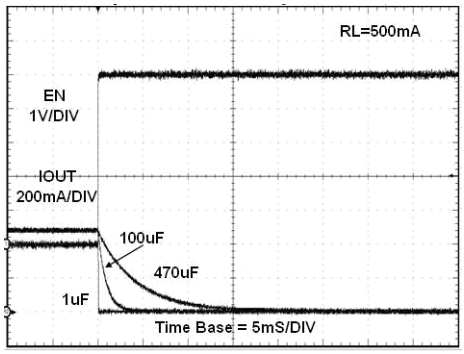



**Figure 6. Current output turn off delay time**



### 7.1.2 Turn on/off characteristics at $V_{OUT}$ = 3.0 V

**Figure 7. Voltage output turn on delay time**

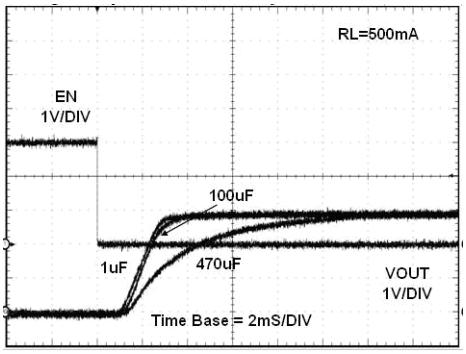



**Figure 8. Voltage output turn off delay time**

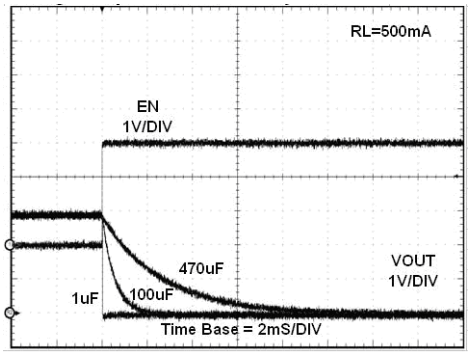



**Figure 9. Current output turn on delay time**

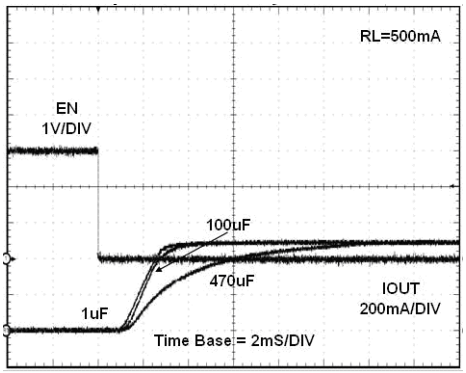
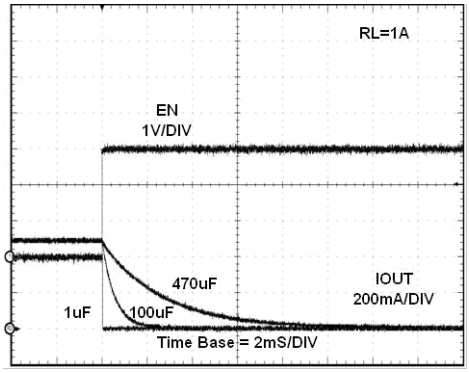



**Figure 10. Current output turn off delay time**




### 7.1.3 UVLO

**Figure 11. UVLO rising**

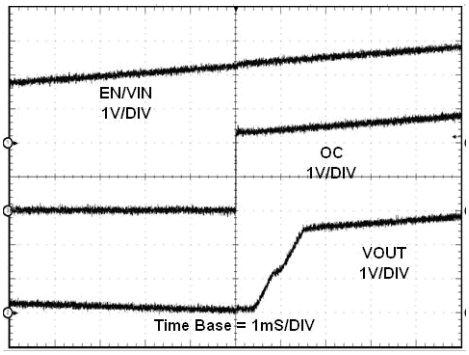
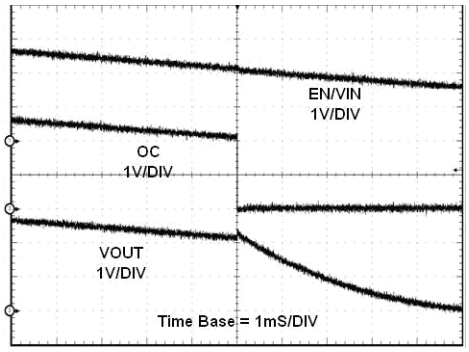



**Figure 12. UVLO falling**



### 7.1.4 OC protection characteristics

**Figure 13. OC protection at $V_{OUT}$ = 3.0 V**

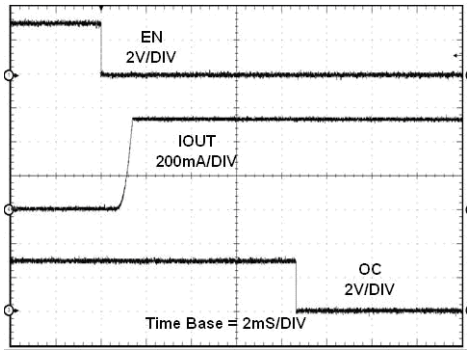



**Figure 14. OC protection at $V_{OUT}$ = 3.0 V**

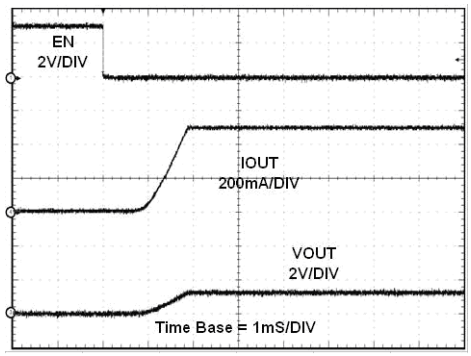



**Figure 15. OC protection at $V_{OUT}$ = 5.0 V**

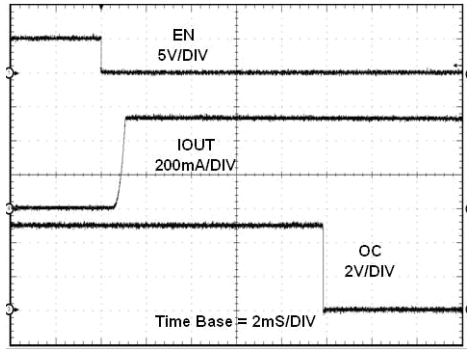
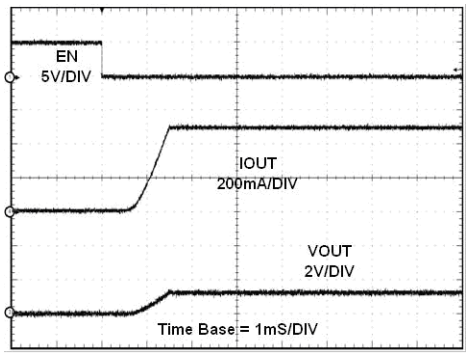



**Figure 16. OC protection at $V_{OUT}$ = 5.0 V**




### 7.1.5 Other electrical characteristics

**Figure 17. $I_{CC}$ vs $V_{IN}$ (enabled)**

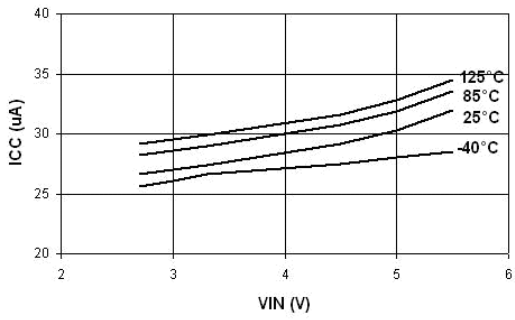



**Figure 18. $I_{CC}$ vs temperature (enabled)**

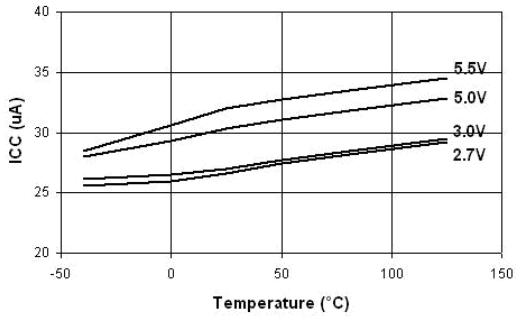


**Figure 19. $I_{CC}$ vs $V_{IN}$ (disabled)**

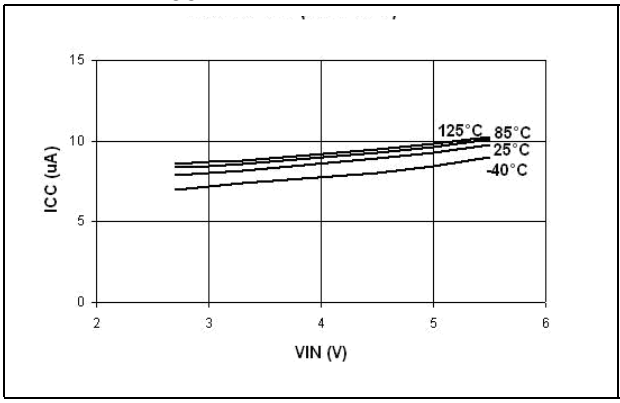



**Figure 20. $I_{CC}$ vs temperature (disabled)**

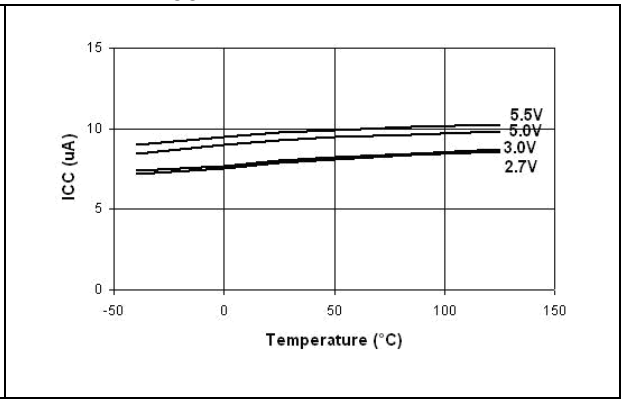



**Figure 21. $R_{DS}$ ON vs $V_{IN}$**

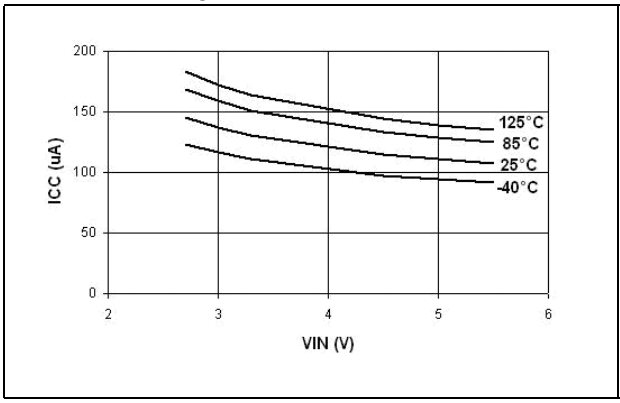



**Figure 22. $R_{DS}$ ON vs temperature**

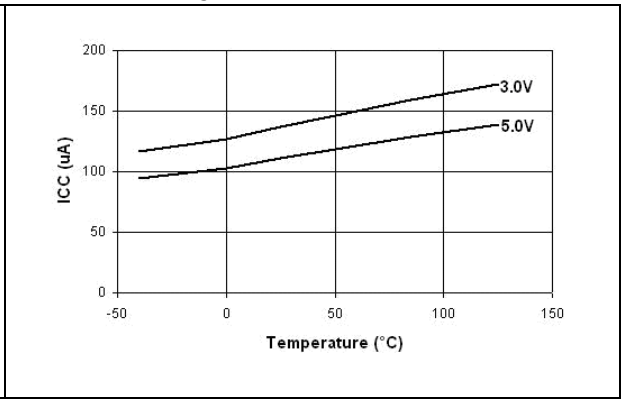



**Figure 23. ILIMIT vs temperature**

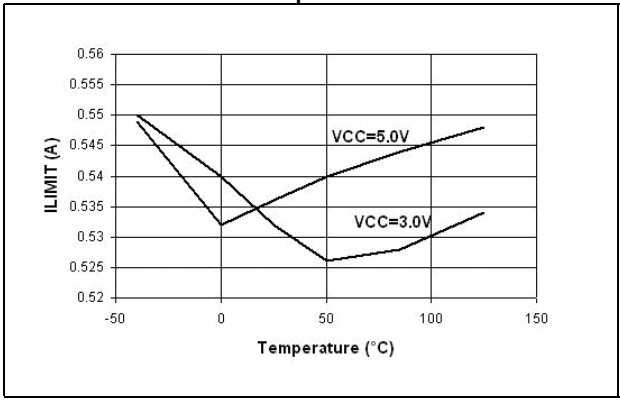



**Figure 24. Switch leakage vs temperature**

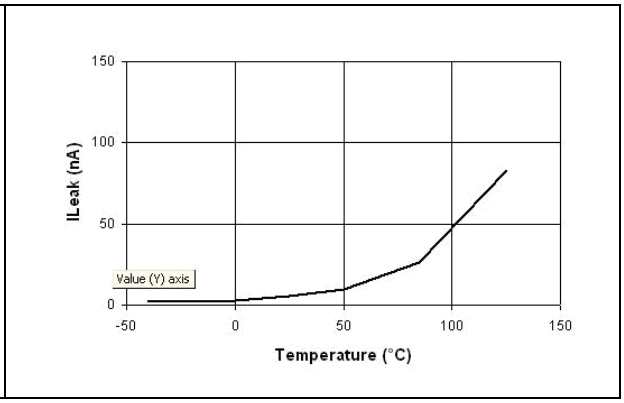


**Figure 25. Output rise time vs. $V_{IN}$**

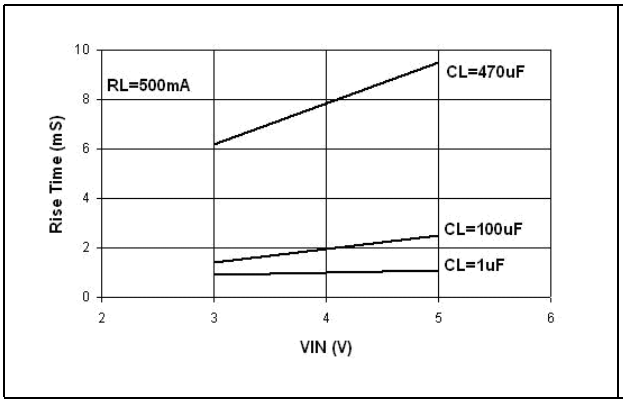



**Figure 26. Output fall time vs. VIN**

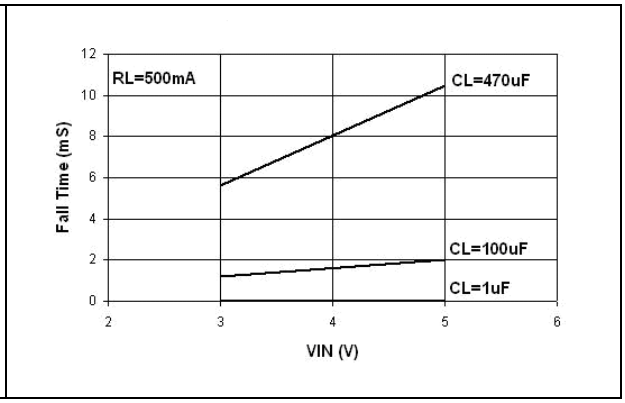
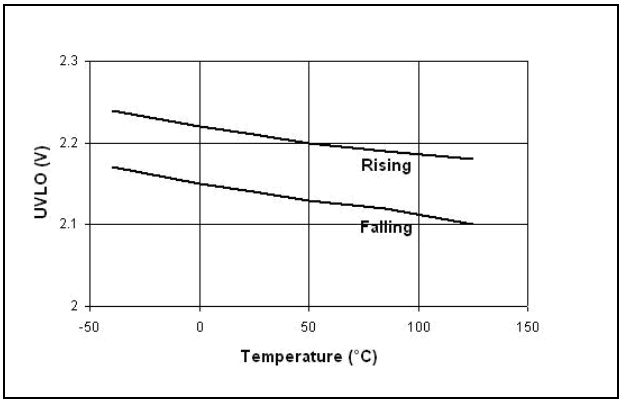



**Figure 27. UVLO vs temperature**



## 7.2 STMPS2161, STMPS2171 electrical charts

### 7.2.1 Turn on/off characteristics at $V_{OUT}$ = 5.0 V

**Figure 28. Voltage output turn on delay time**

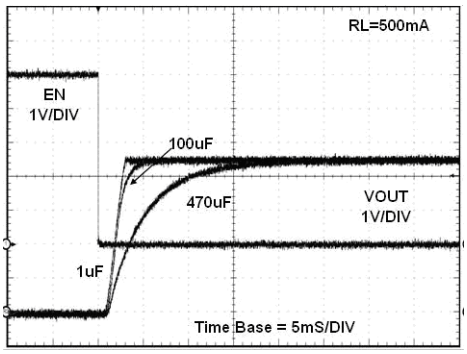



**Figure 29. Voltage output turn off delay time**

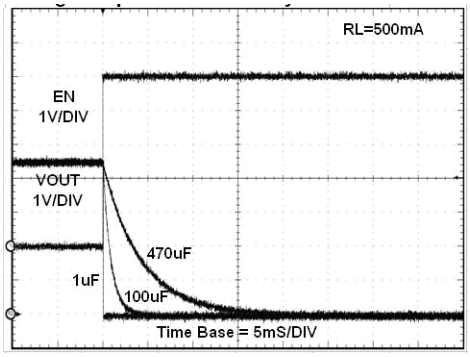



**Figure 30. Current output turn on delay time**

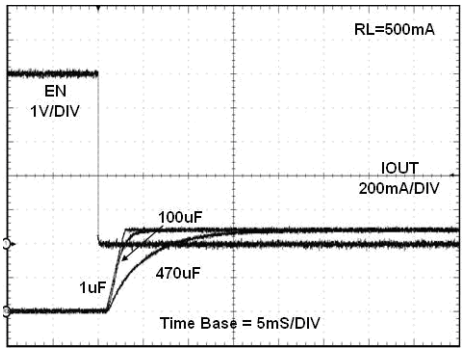
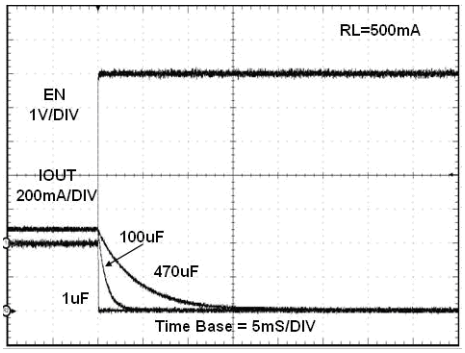



**Figure 31. Current output turn off delay time**



### 7.2.2 Turn on/off characteristics at $V_{OUT}$ = 3.0 V

**Figure 32. Voltage output turn on delay time**

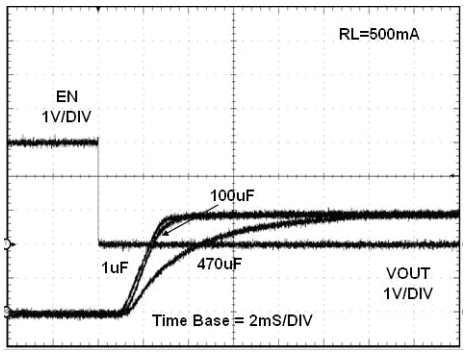



**Figure 33. Voltage output turn off delay time**

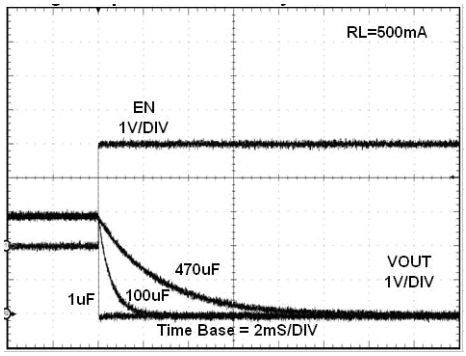



**Figure 34. Current output turn on delay time**

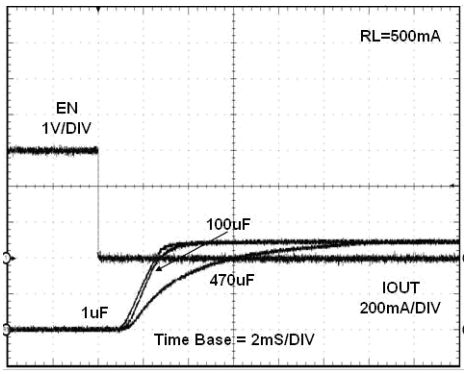
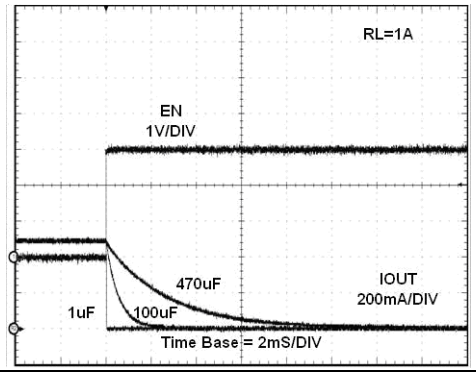



**Figure 35. Current output turn off delay time**




### 7.2.3 UVLO

**Figure 36. UVLO rising**

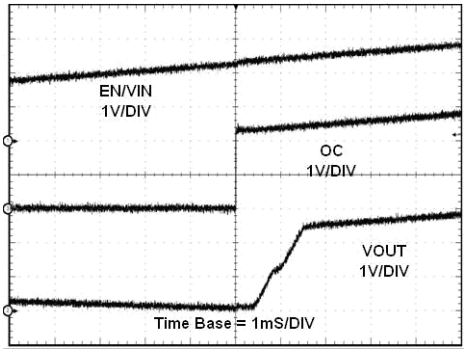
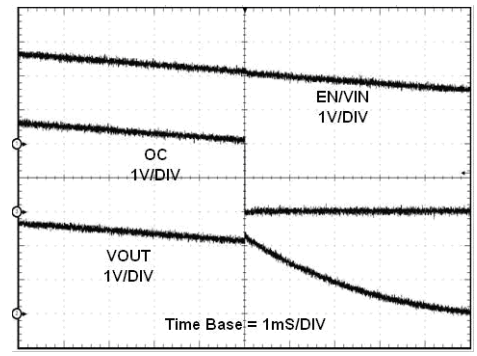



**Figure 37. UVLO falling**



### 7.2.4 OC protection characteristics

**Figure 38. OC protection at $V_{OUT}$ = 3.0 V**

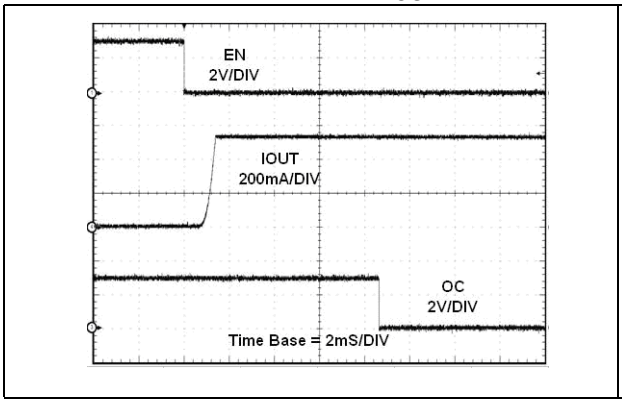



**Figure 39. OC protection at $V_{OUT}$ = 3.0 V**

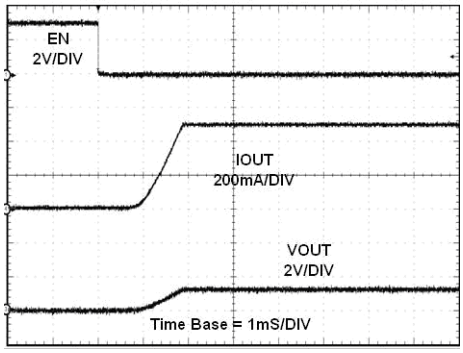



**Figure 40. OC protection at $V_{OUT}$ = 5.0 V**

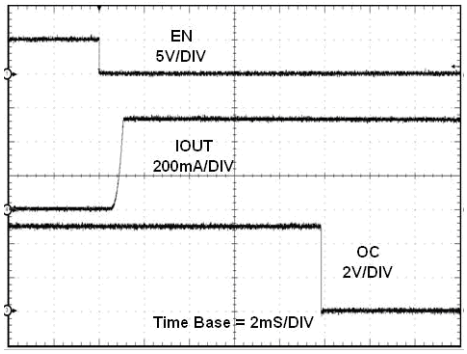
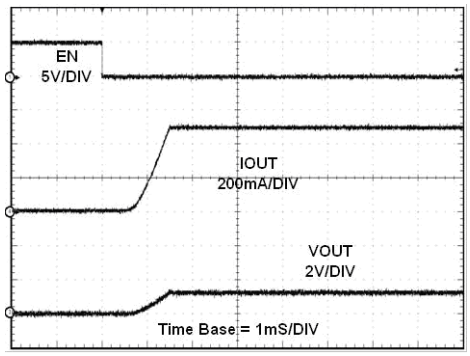



**Figure 41. OC protection at $V_{OUT}$ = 5.0 V**



### 7.2.5 Other electrical characteristics

**Figure 42. $I_{CC}$ vs $V_{IN}$ (enabled)**

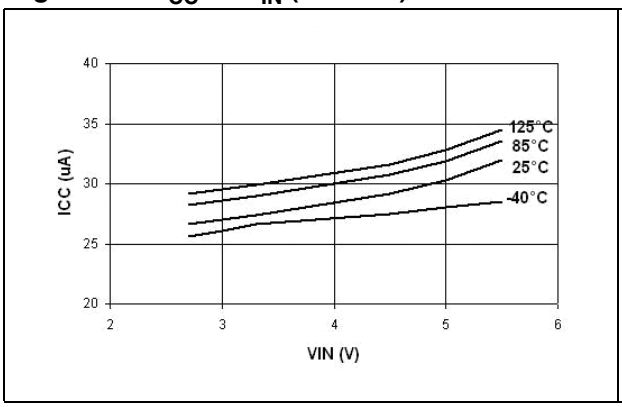



**Figure 43. $I_{CC}$ vs temperature (enabled)**

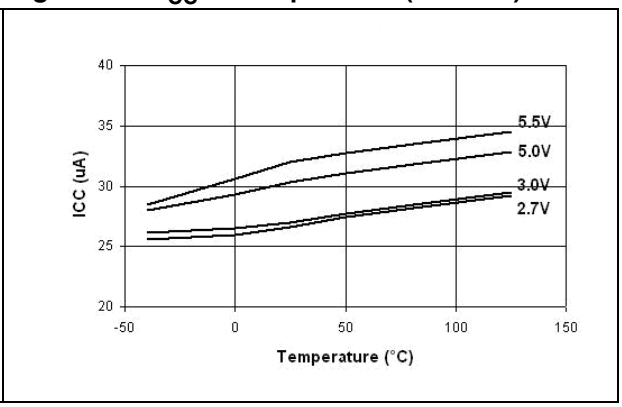



**Figure 44. $I_{CC}$ vs $V_{IN}$ (disabled)**

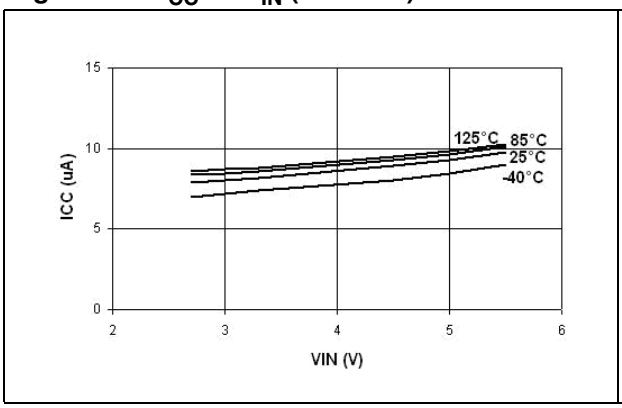



**Figure 45. $I_{CC}$ vs temperature (disabled)**

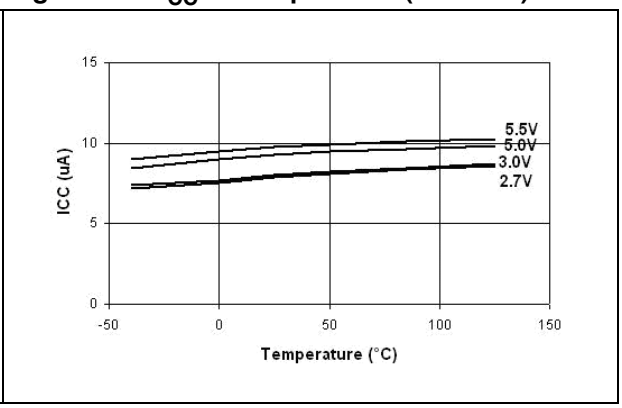



**Figure 46. $R_{DS}$ ON vs $V_{IN}$**

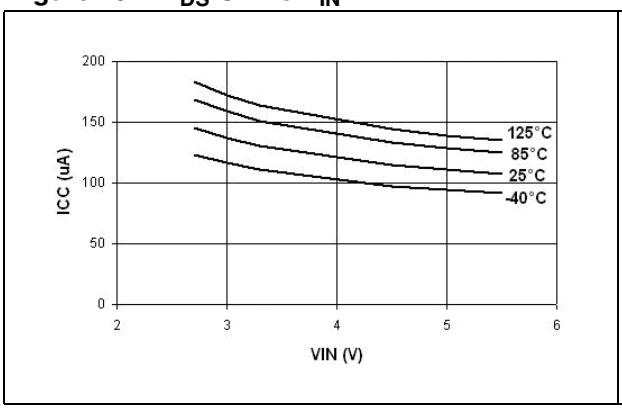



**Figure 47. $R_{DS}$ ON vs temperature**

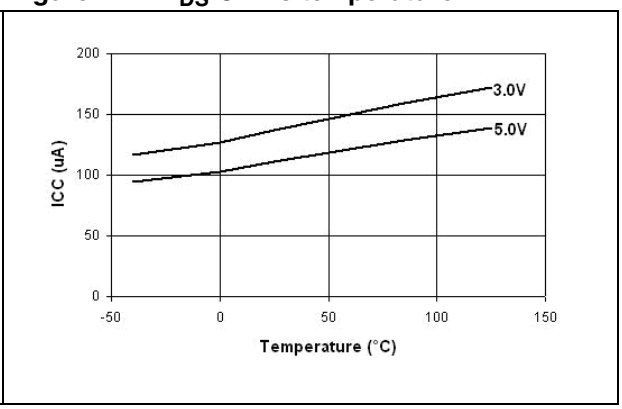


**Figure 48. ILIMIT vs temperature**

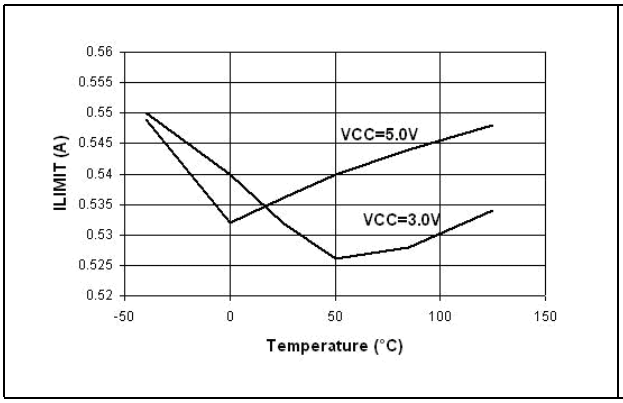



**Figure 49. Switch leakage vs temperature**

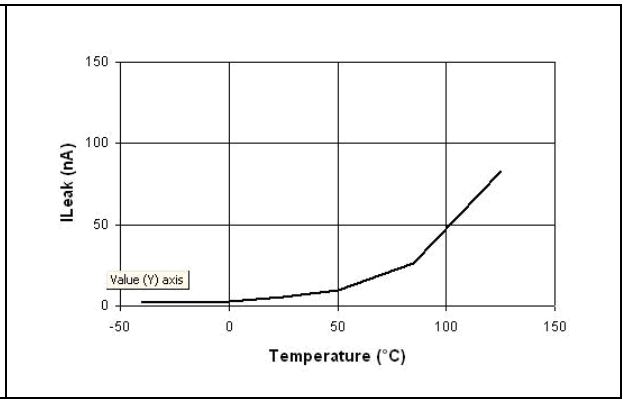



**Figure 50. Output rise time vs. $V_{IN}$**

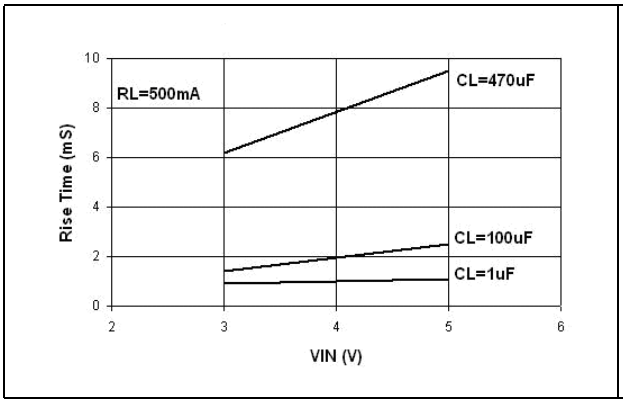



**Figure 51. Output fall time vs. VIN**

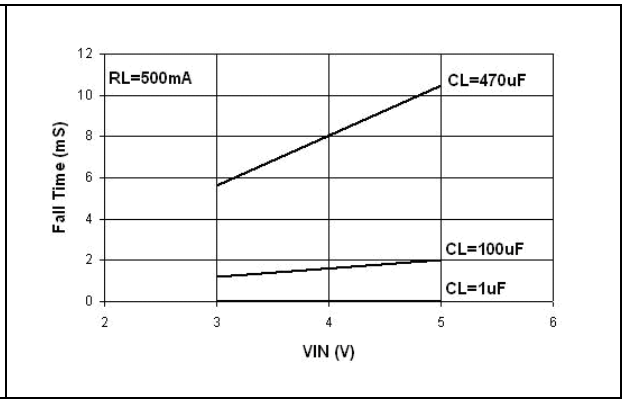
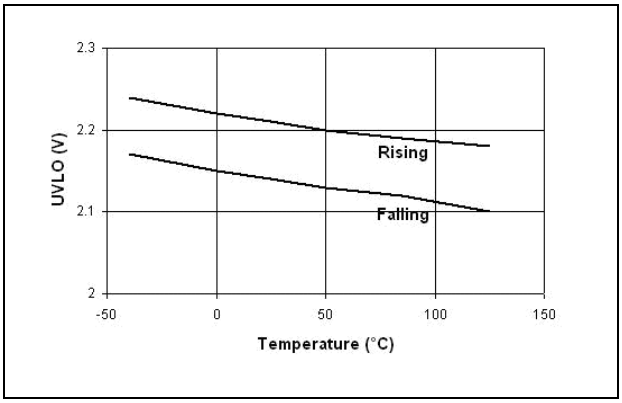



**Figure 52. UVLO vs temperature**



# 8 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

**Figure 53. SOT23-5L package outline**

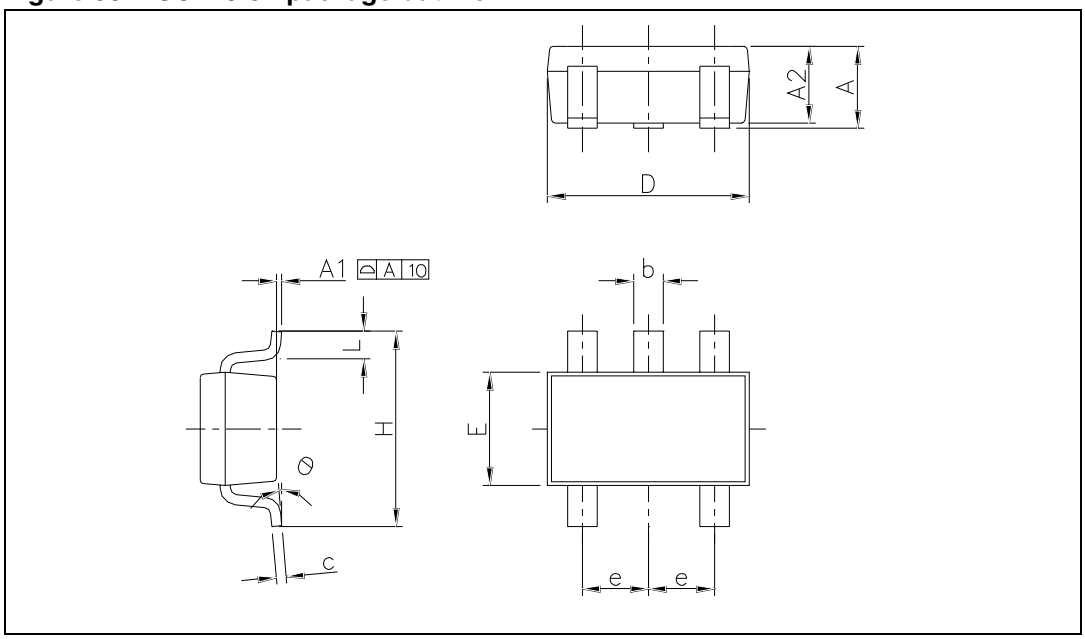



**Table 17. SOT23-5L mechanical data**

| Symbol. | millimeters | | | inches | | |
|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max |
| A | 0.90 | | 1.45 | 35.4 | | 57.1 |
| | | | | | | |
| A1 | 0.00 | | 0.10 | 0.0 | | 3.9 |
| A2 | 0.90 | | 1.30 | 35.4 | | 51.2 |
| b | 0.35 | | 0.50 | 13.7 | | 19.7 |
| C | 0.09 | | 0.20 | 3.5 | | 7.8 |
| D | 2.80 | | 3.00 | 110.2 | | 118.1 |
| E | 1.50 | | 1.75 | 59.0 | | 68.8 |
| e | | 0.95 | | | 37.4 | |
| H | 2.60 | | 3.00 | 102.3 | | 118.1 |
| L | 0.10 | | 0.60 | 3.9 | | 23.6 |

**Figure 54. SOT23-5L footprint recommendation**

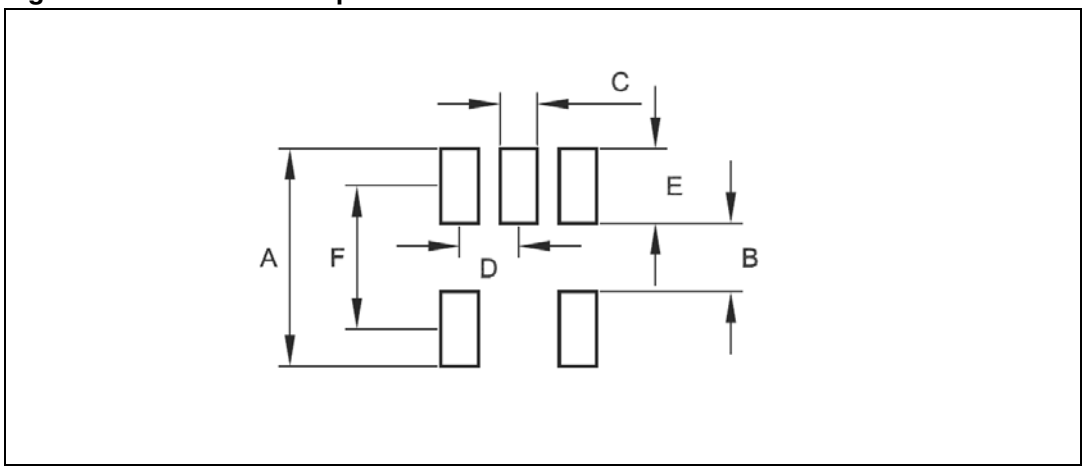
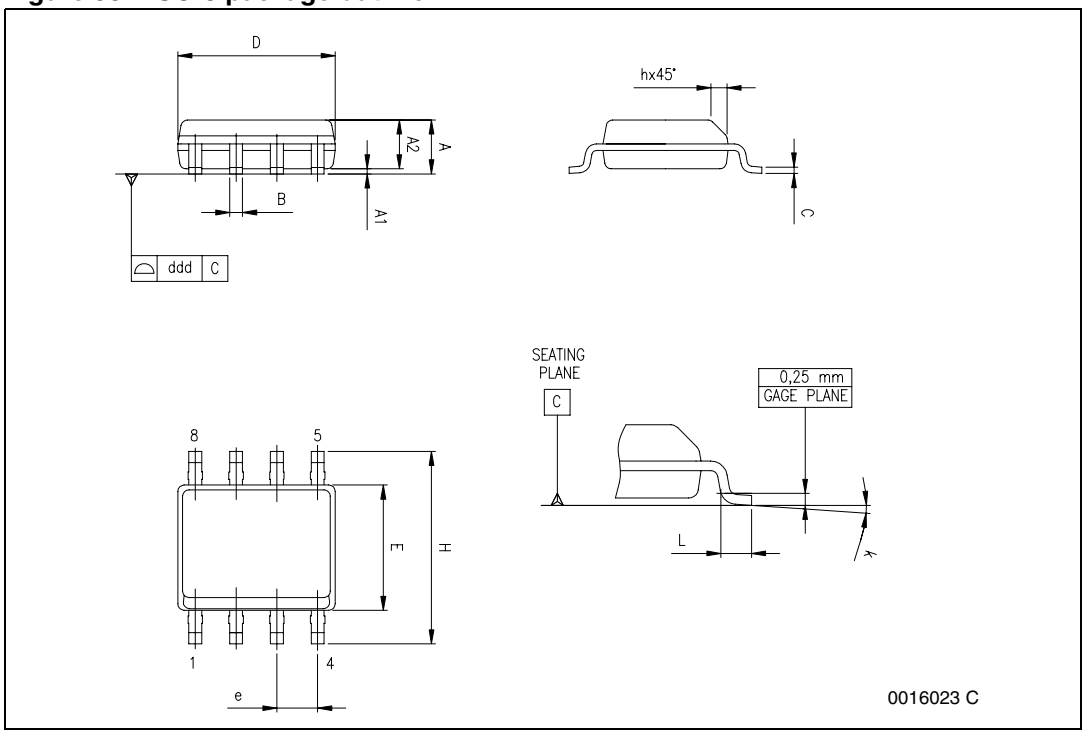



**Table 18. SOT23-5L footprint dimensions**

| Footprint data | | |
|---|---|---|
| **Symbol** | **millimeters** | **inches** |
| A | 3.50 | 0.138 |
| B | 1.10 | 0.043 |
| C | 0.60 | 0.024 |
| D | 0.95 | 0.037 |
| E | 1.20 | 0.047 |
| F | 2.30 | 0.090 |

**Figure 55. SO-8 package outline**



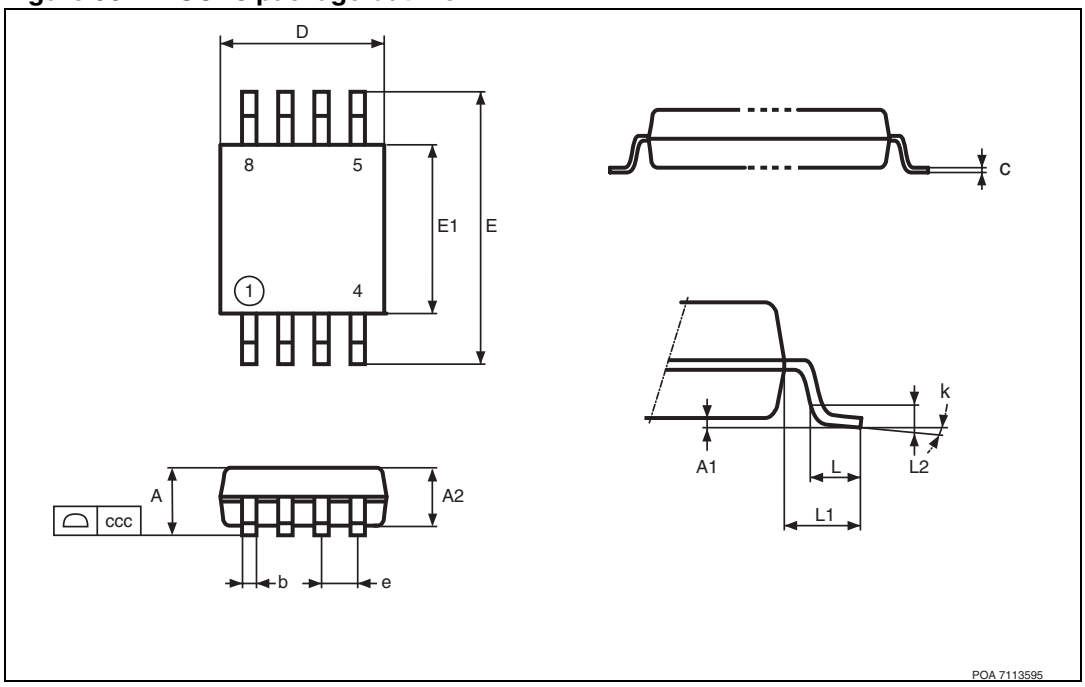

1. Drawing not to scale

**Table 19. SO-8 mechanical data**

| Symbol | millimeters | | | inches | | |
|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max |
| A | 1.35 | | 1.75 | 0.053 | | 0.069 |
| | | | | | | |
| A1 | 0.10 | | 0.25 | 0.004 | | 0.010 |
| A2 | 1.10 | | 1.65 | 0.043 | | 0.065 |
| B | 0.33 | | 0.51 | 0.013 | | 0.020 |
| C | 0.19 | | 0.25 | 0.007 | | 0.010 |
| D (1) | 4.80 | | 5.00 | 0.189 | | 0.197 |
| E | 3.80 | | 4.00 | 0.15 | | 0.157 |
| e | | 1.27 | | | 0.050 | |
| H | 5.80 | | 6.20 | 0.228 | | 0.244 |
| h | 0.25 | | 0.50 | 0.010 | | 0.020 |
| L | 0.40 | | 1.27 | 0.016 | | 0.050 |
| k | 0° (min.), 8° (max.) | | | | | |
| ddd | | | 0.10 | | | 0.004 |

1. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, potrusions or gate burrs shall not exceed 0.15mm (.006inch) in total (both sides).

**Figure 56. MSOP8 package outline**




1. Drawing not to scale.

**Table 20. MSOP8 package mechanical data**

| Symbol | millimeters | | | inches | | |
|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max |
| A | – | – | 1.10 | – | – | 0.043 |
| A1 | 0.05 | – | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 0.75 | 0.85 | 0.95 | 0.031 | 0.034 | 0.037 |
| b | 0.25 | – | 0.40 | 0.010 | 0.013 | 0.016 |
| c | 0.13 | – | 0.23 | 0.005 | 0.007 | 0.009 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E | 4.65 | 4.90 | 5.15 | 0.187 | 0.193 | 0.199 |
| E1 | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| e | – | 0.65 | – | – | 0.026 | – |
| L | 0.40 | 0.55 | 0.70 | 0.016 | 0.022 | 0.028 |
| L1 | – | 0.95 | – | – | 0.037 | |
| K | 0° | – | 6° | 0° | – | 6° |
| ccc | | | 0.10 | | | 0.004 |

# 9 Revision history

**Table 21. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 01-Aug-2007 | 1 | Initial release. |
| 18-Dec-2007 | 2 | Minor text changes, updated *Figure 53 on page 25*, added *Section 7: Detail device characteristics on page 15*. |
| 24-Jan-2008 | 3 | Footnote added in *Table 1 on page 1*, replaced *Figure 56 on page 28* and *Table 20 on page 28*, TSSOP8 package name replaced with MSOP8. |

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