1   LED Driver

1.1   Features

- LED drive current preset to 20 mA
- Output current adjustable up to 65 mA with an external resistor
- Easy paralleling of drivers to increase current
- Supply voltage up to 40 V
- High current accuracy at supply voltage variation
- Low voltage overhead of 1.4 V
- Up to 750 mW power dissipation in a small SC74 package
- Negative thermal coefficient of -0.2 %/K reduces output current at higher temperatures
- RoHS compliant (Pb-free) package
- Automotive qualified according AEC Q101

1.2   Applications

- Channel letters for advertising, LED strips for decorative lighting
- Aircraft, train, ship illumination
- Retrofits for general lighting, white goods like refrigerator lighting
- Medical lighting
- Automotive applications like CHMSL and rear combination lights

1.3   General Description

The XB402U is a cost efficient LED driver to drive low power LEDs. The advantages towards resistor biasing are:

- homogenous light output despite varying forward voltages in different LED strings
- homogenous light output of LEDs despite voltage drop across long supply lines
- homogenous light output independent from supply voltage variations
- longer lifetime of the LEDs due to reduced output current at higher temperatures (negative thermal coefficient)

The advantages towards discrete solutions are:

- lower assembly cost
- smaller form factor
- higher reliability due to less soldering joints
- higher output current accuracy due to pretested LED drivers

Dimming is possible by using an external digital transistor at the ground pin.

The XB402U can be operated at higher supply vo ltages by putting LEDs between the supply voltage V_S and the power supply pin of the LED driver. You can find further details in our application notes.

The XB402U is a perfect fit for numerous low power LED applications by combining small form factor with low cost. These LED drivers offer several advantages to resistors like significantly higher current control at very low voltage drop ensuring high lifetime of LEDs.
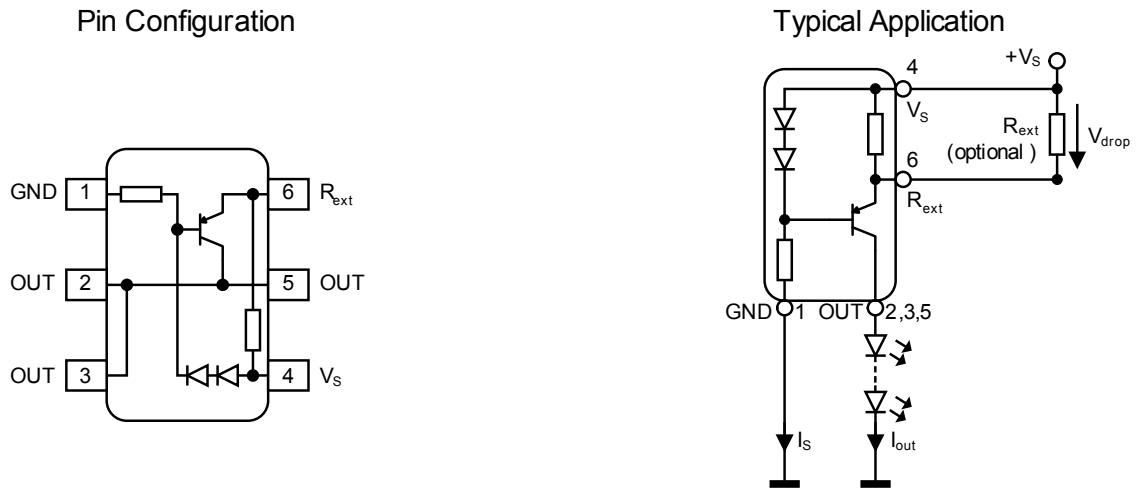
Pin Configuration

Typical Application

Figure 1-1   Pin configuration and typical application

Sales Name	Marking	Pin Configuration				Package
XB402U	L279	1 = GND	2; 3; 5 = OUT	4 = V_S	6 = R_{ext}	SC74-6

2 Electrical Characteristics

Table 2-1 Maximum Ratings at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_S	-	-	40	V	
Output current	I_{out}	-	-	65	mA	
Output voltage	V_{out}	-	-	40	V	
Reverse voltage between all terminals	V_R	-	-	0.5	V	
Total power dissipation	P_{tot}	-	-	750	mW	T_S ≤ 112.5 °C
Junction temperature	T_J	-	-	150	°C	
Storage temperature range	T_{STG}	-65	-	150	°C	

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

Table 2-2 Thermal Resistance at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Junction - soldering point[1]	R_{thJS}	-	-	50	K/W	

1) For calculation of R_{thJA} please refer to Application Note AN077 (Thermal Resistance Calculation)

Table 2-3 Electrical Characteristics at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Collector-emitter breakdown voltage	$V_{BR(CEO)}$	40	-	-	V	I_C = 1 mA, I_B = 0
Supply current	I_S	340	420	500	µA	V_S = 10 V
DC current gain	h_{FE}	100	220	470	-	I_C = 50 mA, V_{CE} = 1 V
Internal resistor	R_{int}	38	44	52	Ω	I_{Rint} = 10 mA
Output current	I_{out}	18	20	22	mA	V_S = 10 V V_{out} = 8.6 V
Voltage drop (V_{Rext})	V_{drop}	0.8	0.85	0.9	V	I_{out} = 20 mA

Table 2-4 DC Characteristics with stabilized LED load at T_A = 25 °C, unless otherwise specified

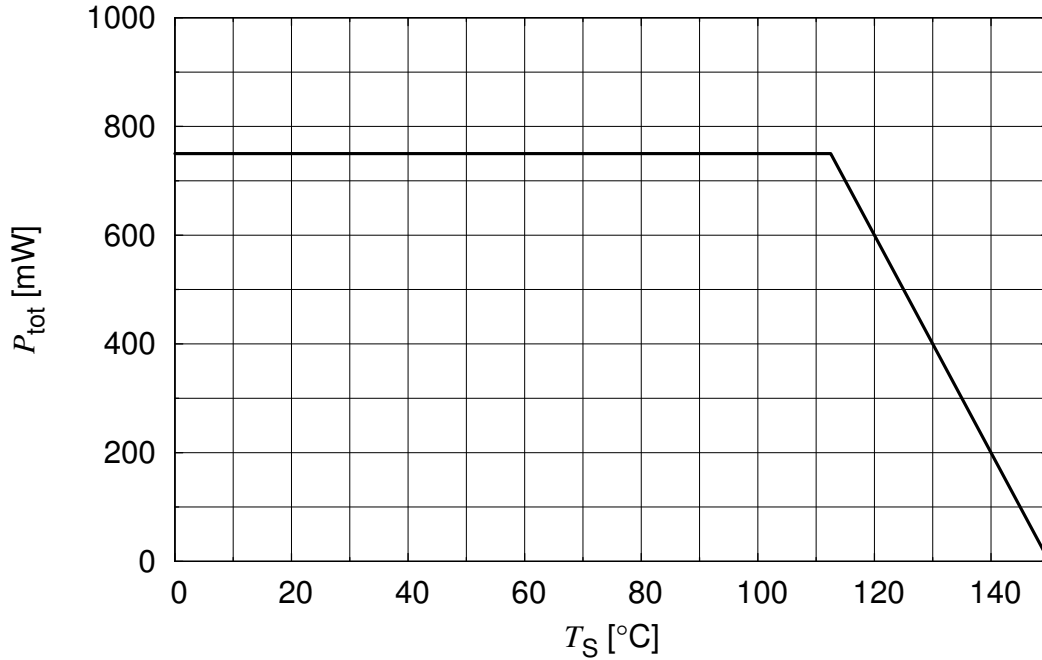| Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Lowest sufficient supply voltage overhead	V_{Smin}	-	1.4	-	V	I_{out} > 18 mA
Output current change versus T_A	$\Delta I_{out}/I_{out}$	-	-0.2	-	%/K	V_S = 10 V
Output current change versus V_S	$\Delta I_{out}/I_{out}$	-	1	-	%/V	V_S = 10 V

3　　Typical characteristics

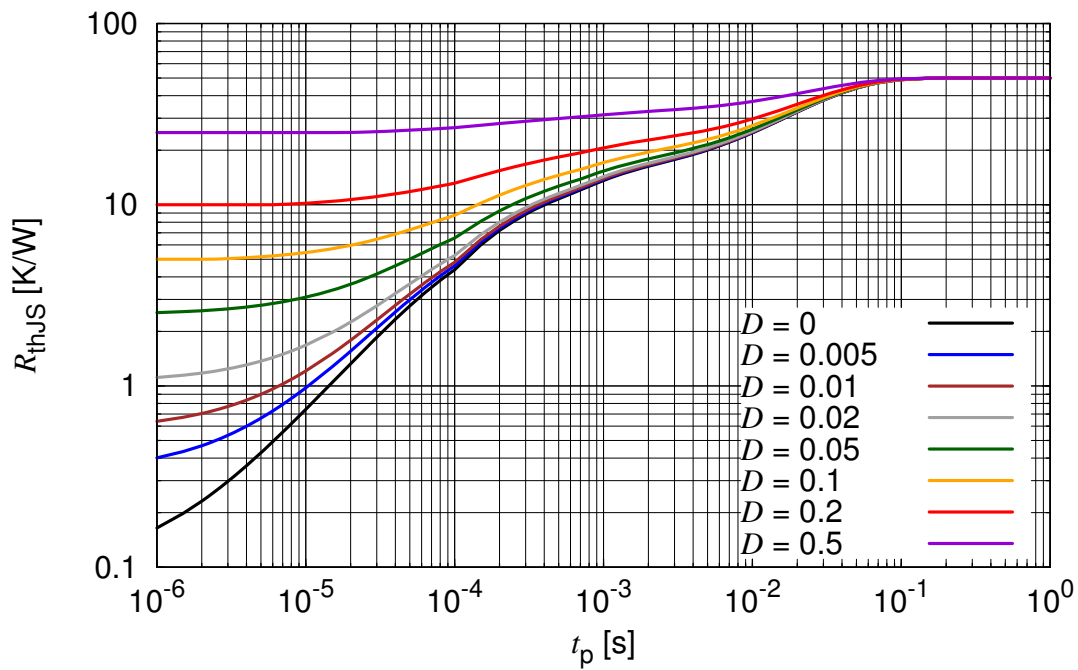**Figure 3-1　Total Power Dissipation** $P_{tot} = f(T_S)$

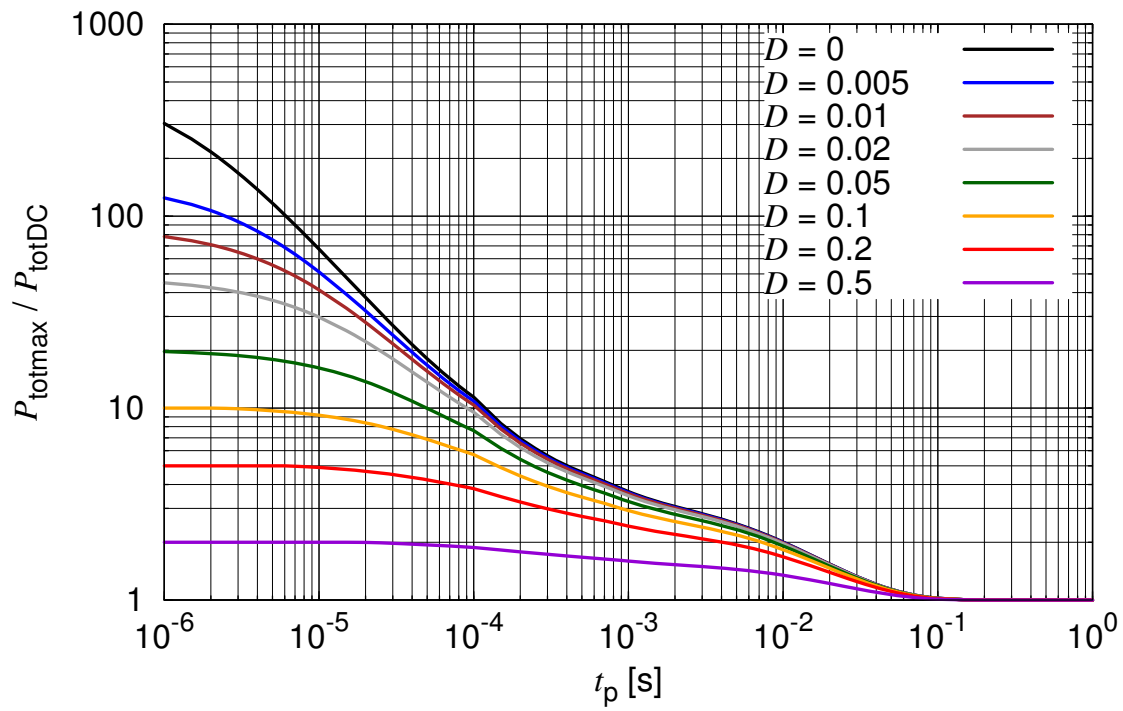**Figure 3-2　Permissible Pulse Load** $R_{thJS} = f(t_p)$

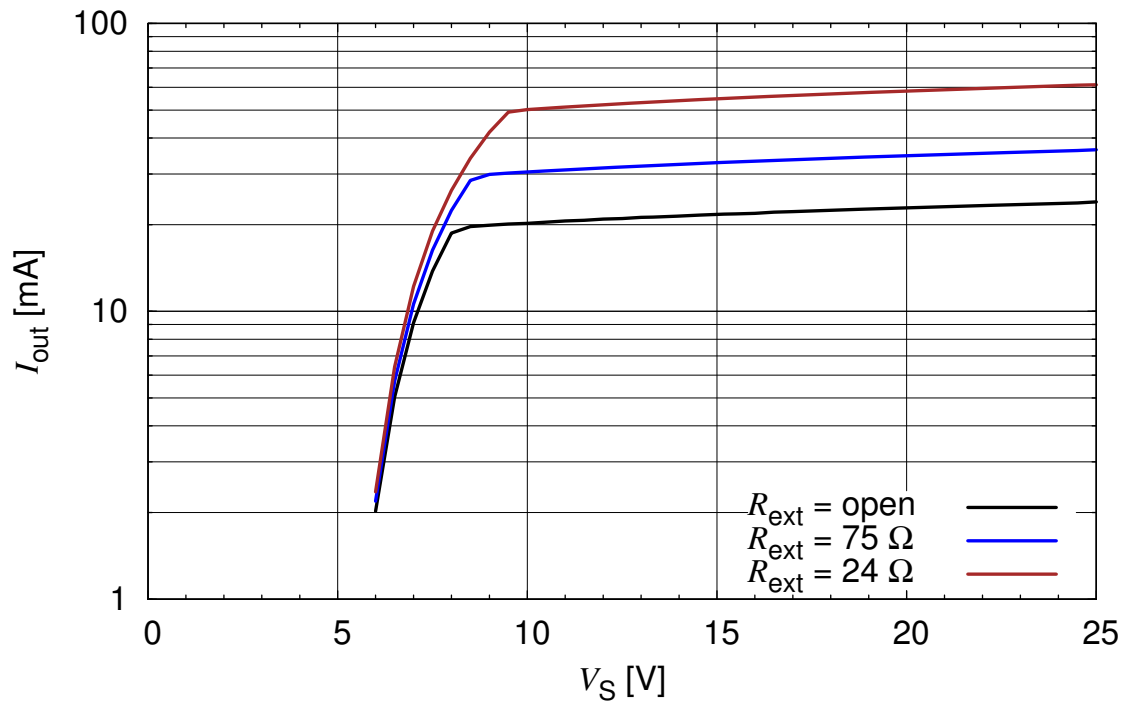**Figure 3-3   Permissible Pulse Load** $P_{totmax} / P_{totDC} = f(t_p)$

Figure 3-4   Output Current versus V_S $I_{out} = f(V_S)$, V_S - V_{out} = 1.4 V, R_{ext} = Parameter
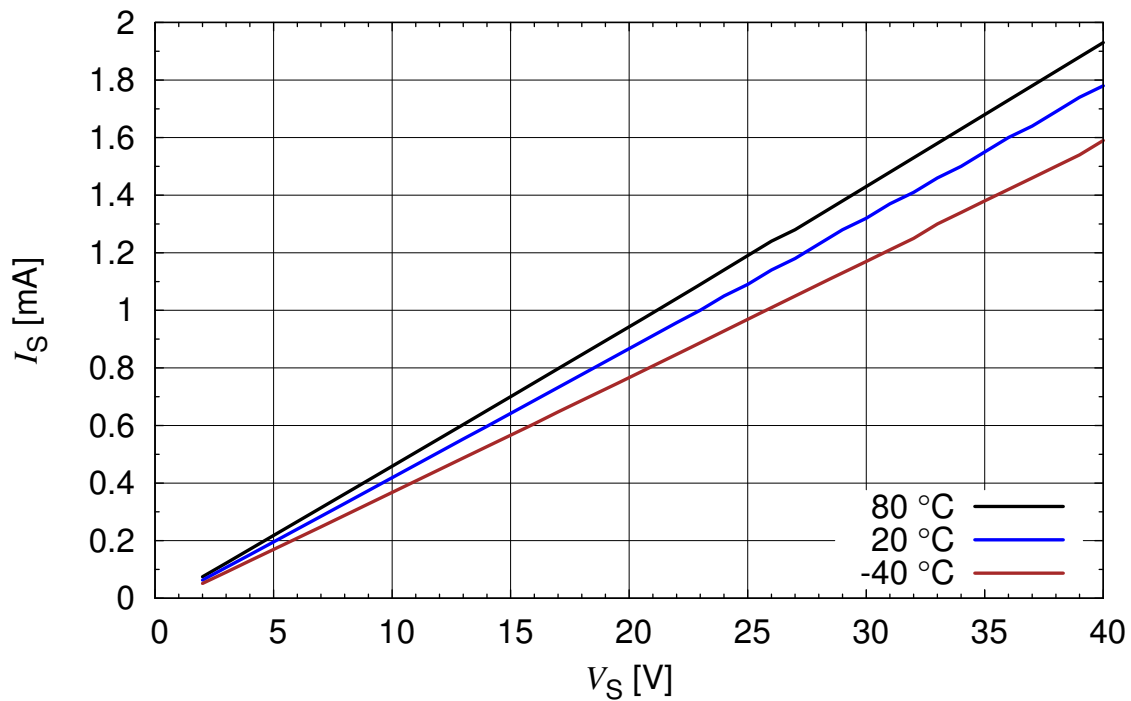

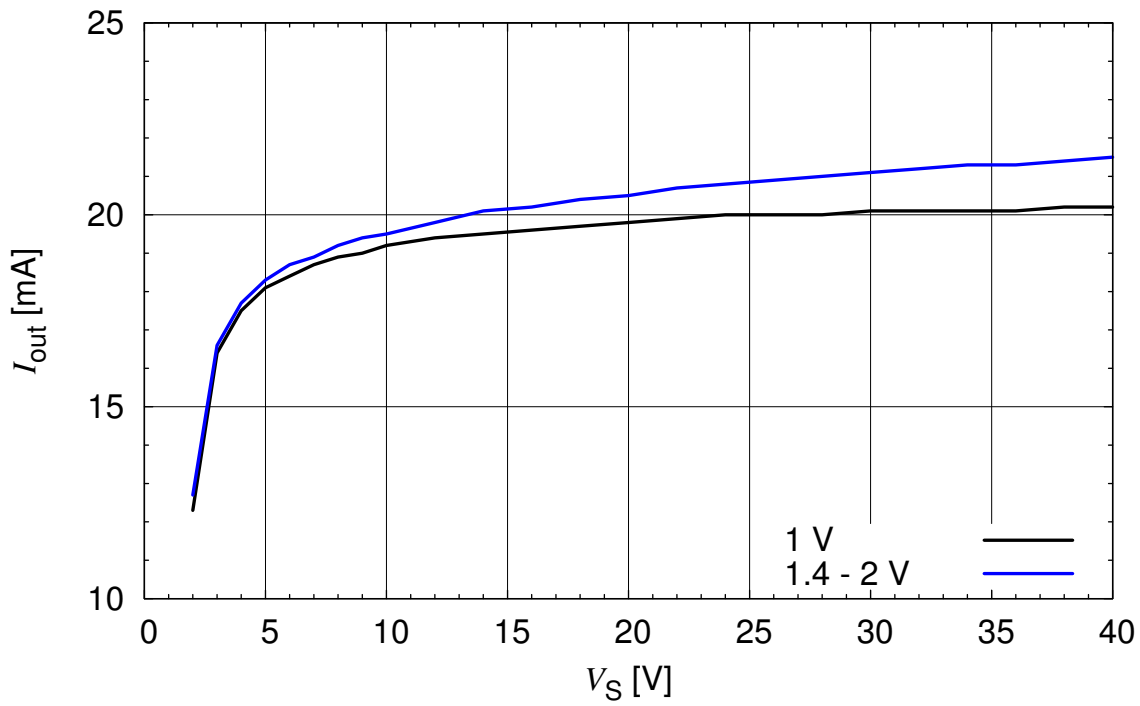**Figure 3-5   Supply Current versus V_S** $I_S = f(V_S)$, T_A = Parameter

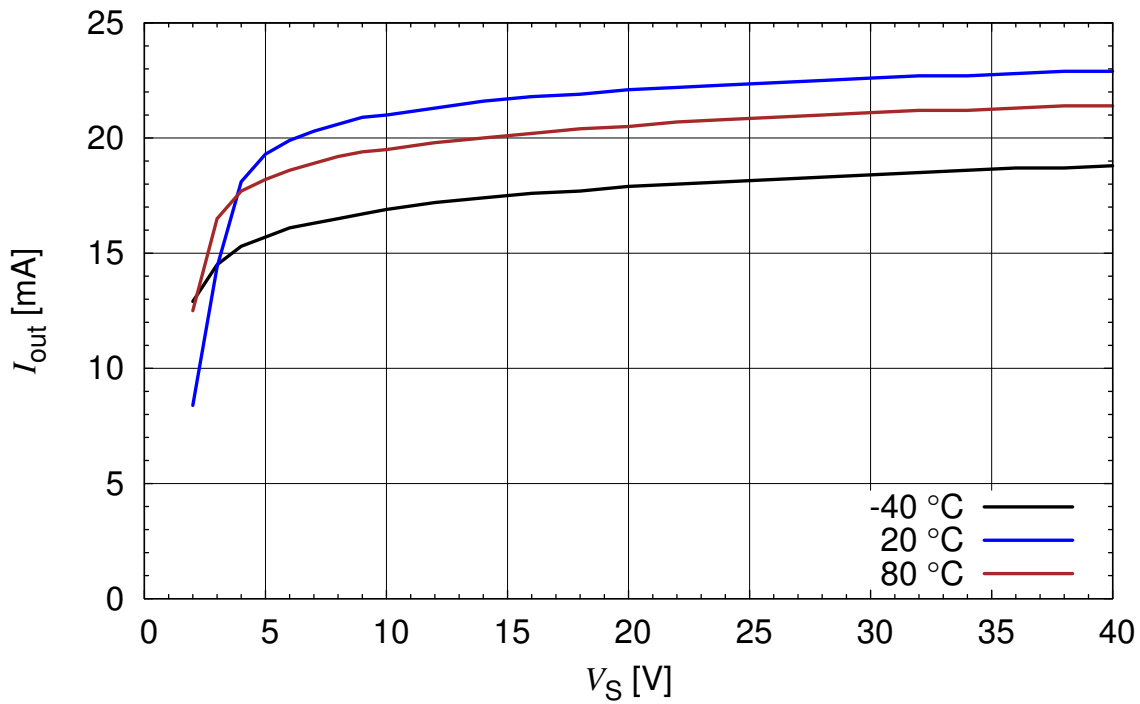**Figure 3-6   Output Current versus V_S I_{out} = $f(V_S)$, V_S - V_{out} = Parameter**

Figure 3-7   Output Current versus V_S I_{out} = $f(V_S)$, V_S - V_{out} = 1.4 V, T_A = Parameter

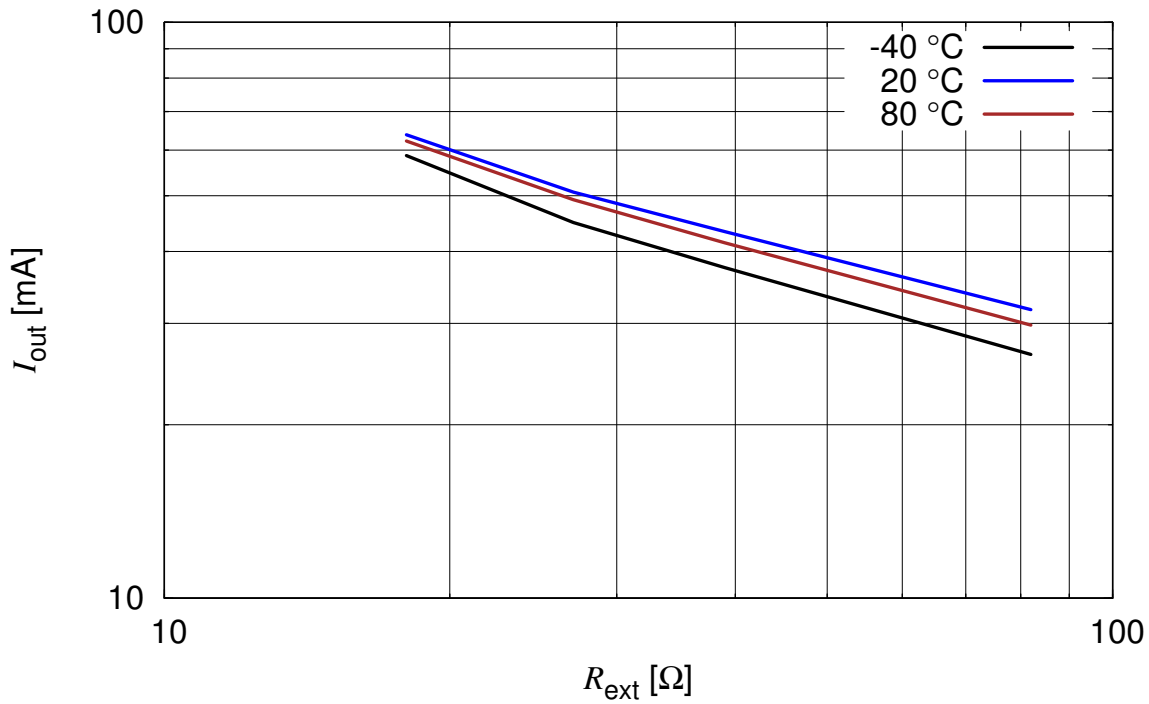**Figure 3-8 Output Current versus R_{ext}** I_{out} = $f(R_{ext})$, V_S = 10 V, V_S - V_{out} = 1.4 V, T_A = Parameter

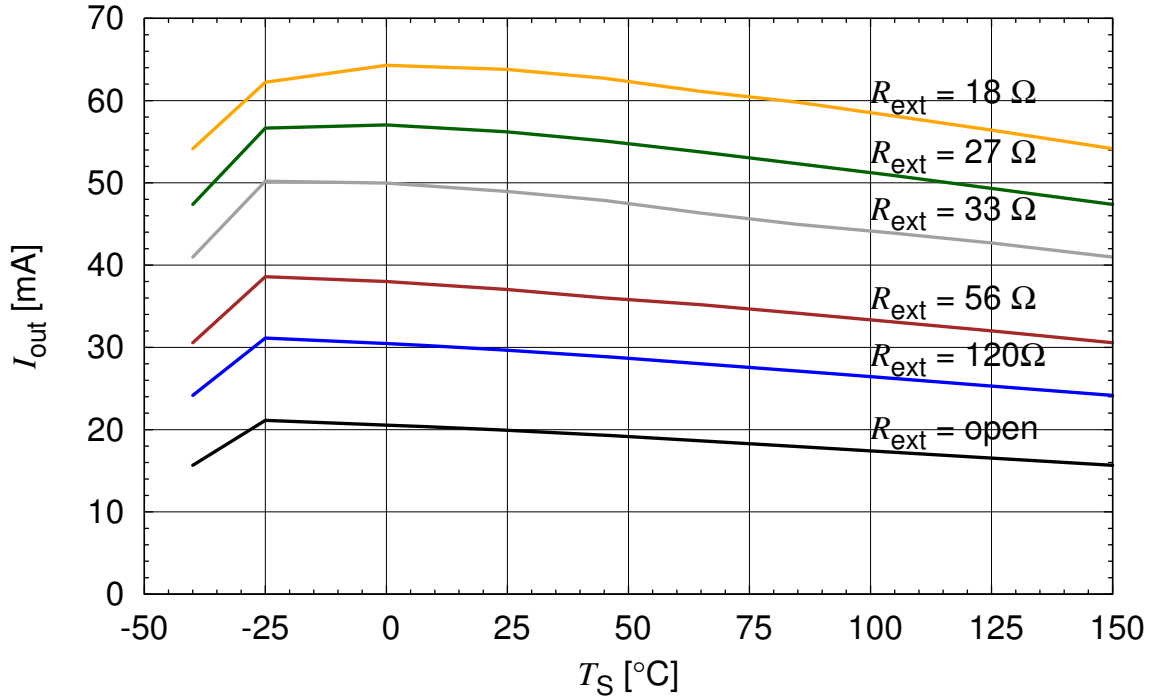**Figure 3-9 Output Current versus T_S** I_{out} = $f(T_S)$, V_S = 10 V, V_S - V_{out} = 1.4 V, R_{ext} = Parameter
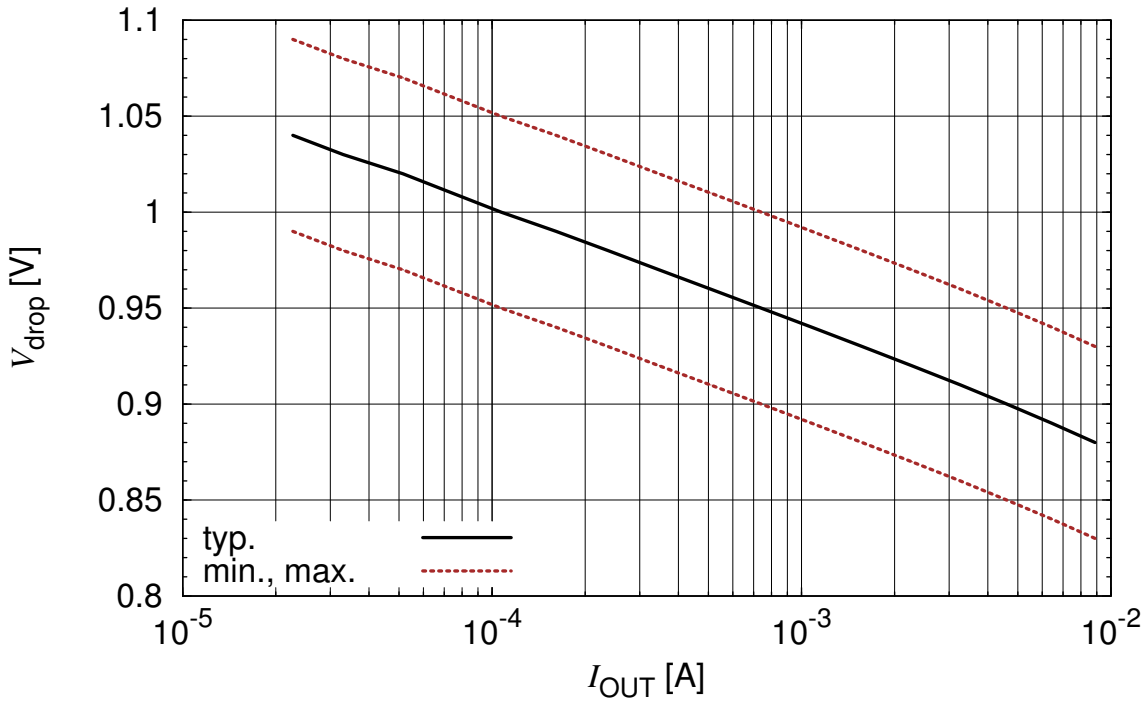
Figure 3-10 Reference Voltage V$_{drop}$ vs I$_{out}$ $V_{drop} = f(I_{out})$, I_{out} = 10 μA to 10 mA
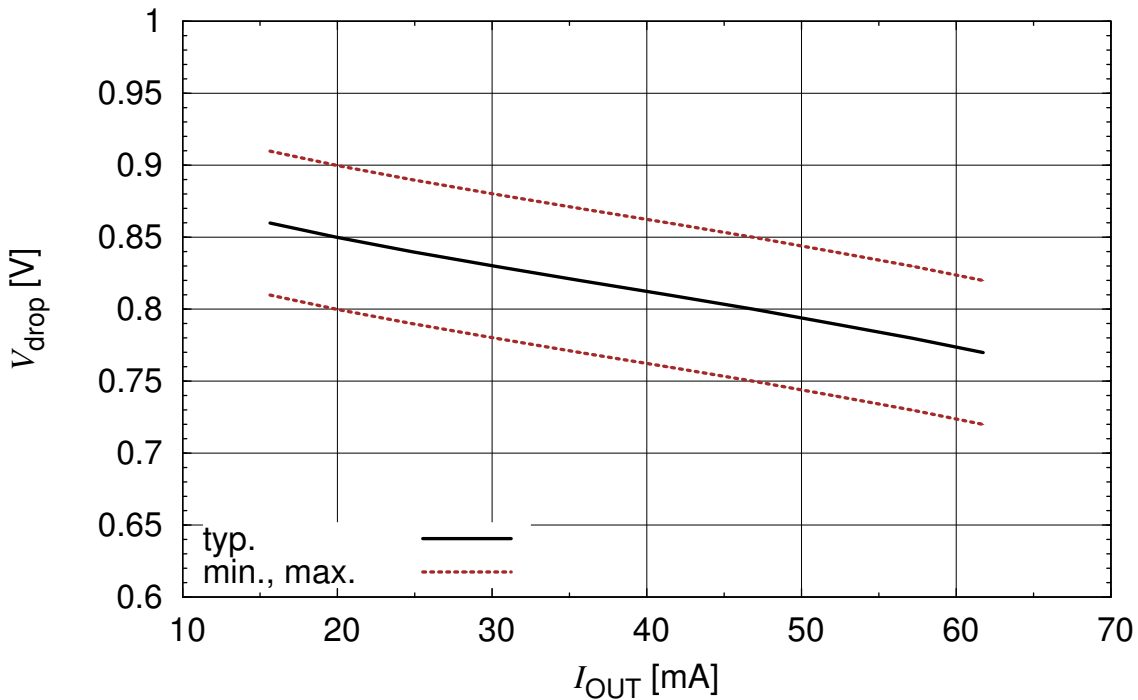

Figure 3-11 Reference Voltage V$_{drop}$ vs I$_{out}$ $V_{drop} = f(I_{out})$, I_{out} = 10 mA to 65 mA
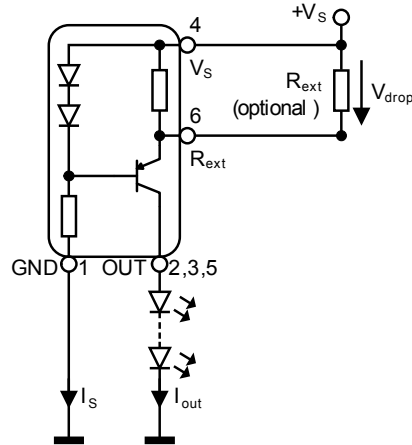
4   Application hints

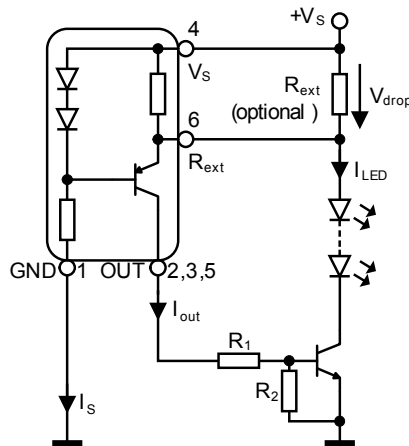**Figure 4-1   Application Circuit: Stand alone current source**

Figure 4-2   Application Circuit: Boost mode current source with external power transistor

Application hints

XB402U serves as an easy to use constant current source for LEDs. In stand alone application an external resistor R_{ext} can be connected to adjust the current between 20 mA and 65 mA. R_{ext} can be determinedby using **Figure 3-8**. Connecting a low tolerance resistor R_{ext} will improve the overall accuracy of the current senseresistance formed by the parallel connection of R_{int} and R_{ext} leading to an improved current accuracy. Please takeinto account that the resulting output currents will be slightly lower due to the self heating of the component andthe negative thermal coefficient.

5 SC74-6

2.9 ±0.2   B
(2.25)
(0.35)

6 5 4

1 2 3

Pin 1
marking

$0.35^{+0.1}_{-0.05}$ ⊕ 0.2 Ⓜ B 6x

0.95

1.9

1.1 MAX.
$0.15^{+0.1}_{-0.06}$
2.5 ±0.1
0.25 ±0.1
1.6 ±0.1
A
0.1 MAX.
= 0.2 Ⓜ A

以上信息仅供参考. 如需帮助联系客服人员。谢谢 XINLUDA