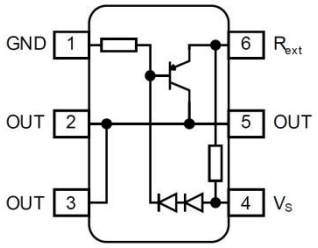
GENERAL DESCRIPTION

The 402UK is a cost efficient LED driver to drive low power LEDs. The advantages towards resistor biasing are: light output despite varying forward voltages in different LED strings, despite voltage drop across long supply lines, light output independent from supply voltage variations and 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, high output current accuracy. Dimming is possible by using an external digital transistor.
The 402UK can be operated at higher supply voltages by putting LEDs between the supply voltage V_S and the power supply pin of the LED driver. The 402UK 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 significally higher current control at very low voltage drop ensuring high lifetime of LEDs.

PIN CONFIGURATION



Package: SC74
Pin Assignment:
1=Gnd
2, 3, 5=Out
4=Vs
6=Rext

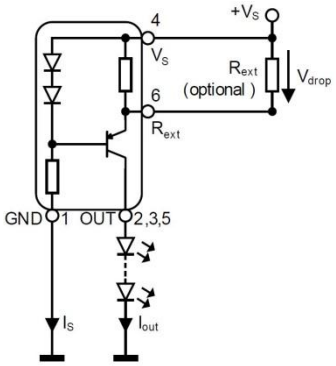
FEATURES

- LED drive current of 20mA
- Output current adjustable up to 65mA with external resistor
- Supply voltage up to 40V
- Easy paralleling of drivers to increase current
- Low voltage overhead of 1.4V
- High current accuracy at supply voltage variation
- No EMI
- High power dissipation of 750mW
- Reduced output current at higher temperatures - Negative thermal coefficient of -0.5% / K

APPLICATIONS

- 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

TYPICAL APPLICATION



ABSOLUTE MAXIMUM RATINGS

Parameters	Symbol	Ratings	Unit
Max. Supply Voltage	V_S	42	V
Max. Output Current	I_{OUT}	65	mA
Max. Output Voltage (at V_S=40V)	V_{OUT}	38	V
Reverse Voltage between all terminals	V_R	0.5	V
Total Power Dissipation, T_S = 125°C	P_{tot}	750	mW
Max. Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-65 to +150	°C
Thermal Resistance (Junction-soldering point)	Rth_{JS}	50	K/W
Operating Temperature, T_S	T_S	-40 to +125	°C

T_S = temperature of soldering point.

RECOMMENDED OPERATING CONDITIONS

Parameters	Symbol	Ratings	Unit
Operating Ambient Temperature Range	T_{OPR}	-40 to +85	°C
Operating Supply Voltage Range (at I_{OUT}≥18mA, V_S-V_{OUT} =1.4V)	V_S	5 to 40	V

ELECTRICAL CHARACTERISTICS

At T_A=25°C, Rext=Open, unless otherwise specified.

Parameters	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Collector-emitter Breakdown Voltage	$V_{BR(CEO)}$	I_C=1mA, I_B=0	40			V
Supply Current	I_S	V_S=10V	340	440	540	µA
DC Current Gain	h_{FE}	I_C =50mA, V_{CE}=1V, Rext=0 Ohm	100	140	470	-
Internal Resistor	R_{int}	I_{Rint} =10mA	37	44	53	Ohm
Output Current	I_{OUT1}	V_S =10V, V_{OUT}=8.6V	18	20	22	mA
Voltage Drop (V_S - V_E)	V_{drop}	I_{OUT}=I_{OUT1}	0.83	0.88	0.93	V
Output Current Change versus T_A	$\Delta I_{OUT}/I_{OUT1}$	V_S=10V, (V_S-V_{OUT}) =1.4V		-0.5		%/K
Output Current Change versus V_S	$\Delta I_{OUT}/I_{OUT1}$	V_S= 10V to 40V, (V_S-V_{OUT})=1.4V		1		%/V

TYPICAL PERFORMANCE CHARACTERISTICS

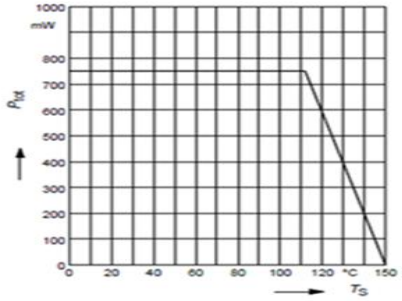


Fig. 1 Permissible Total Power Dissipation P_{tot} vs T_S

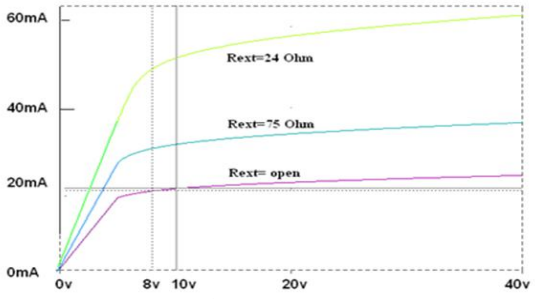


Fig. 2 Output Current vs Supply Voltage, (V_S-V_{OUT}) =1.4V

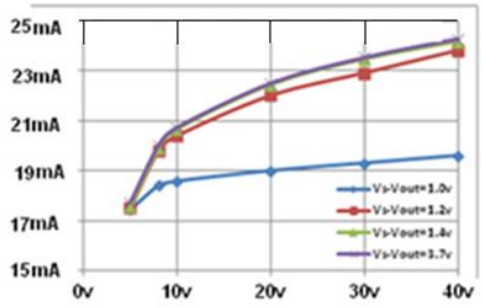


Fig. 3 Output Current vs Supply Voltage (V_S-V_{OUT}) as Parameter, Ta = 25°C

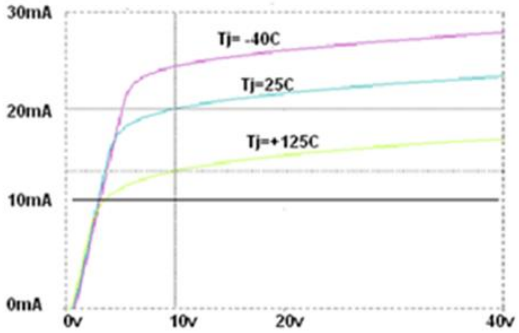


Fig. 4 Output Current vs Supply Voltage T_J as Parameter, (V_S-V_{OUT})=1.4V

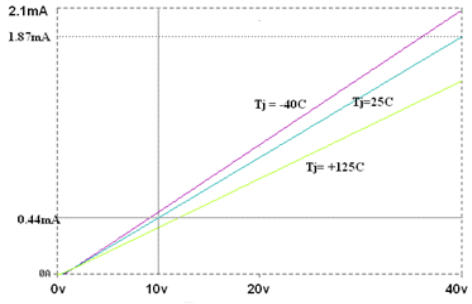
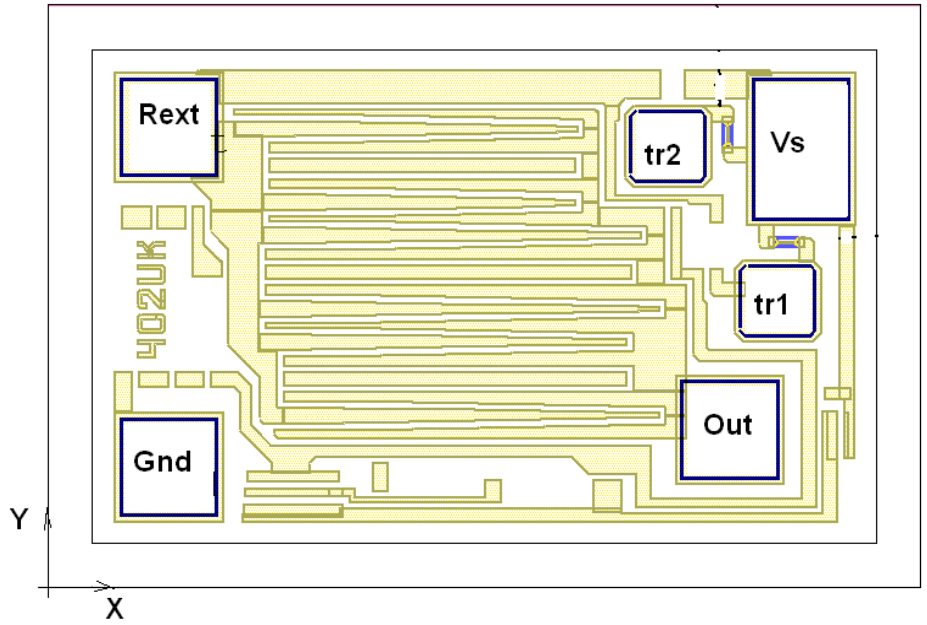


Fig. 5 Supply Current vs Supply Voltage

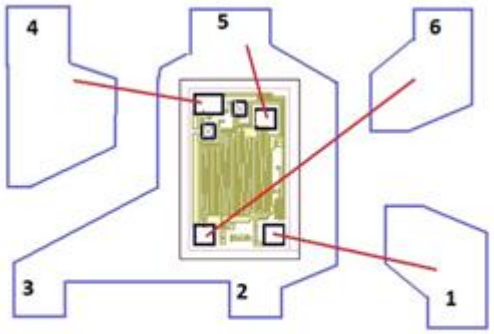
PAD LOCATION AND COORDINATES



Die size (including scribe line): 0.80mm×0.53mm

Pad N	Name (Package)	Pad centers coordinates (µm)		Pad Size (µm x µm)
		X	Y	
1	Gnd	110	110	90×90
2,3,5	Out	625	145	90×90
4	Vs	690	400	130×90
6	Rext	110	420	90×90

BONDING DIAGRAM



Package SC-74 (Bottom view)

ASSEMBLY CHARACTERISTICS

No.	Assembly Characteristics	Value
1	Wafer Size	6 Inch
2	Wafer Thickness before Grinding	675 +/-25 µm
3	Scribe Street Width	80 µm
4	Chip Size (including Scribe Line)	0.80×0.53 mm^2
5	Die Attach Material	Substrate is connected to Out
6	Quantity of Bond Pad Metal Layers	1
7	Pad Thickness	1.6 µm
8	Composition of Metal Layers	Al+Si(1.0%)+Ti(0.5%)
9	Min. Bond Pad Opening Size	90×90 µm
10	Min. Bond Pad Pitch	230 µm
11	Min. Wire Diameters	1 mil (25 µm)
12	Circuit Under Pad Design (CUP)	No

ADDITIONAL INFORMATION

Pb-free products:

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.

Green products:

- Lead-free (RoHS compliant).
- Halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

The appearance complies with the requirements of the company standards.