

HV601K**LED Driver For The Lighting Based On
Super-bright Light-Emitting Diodes**

Preliminary

January 2011- revised March 2014

**GENERAL DESCRIPTION**

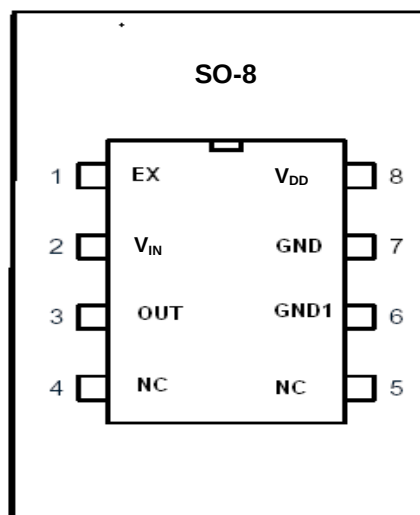
HV601K is an integrated circuit of a general-purpose driver designed to control brightness of LED lamps in wide limits. The circuit is highly efficient for small sizes of lighting-intended LED clusters.

FEATURES

- EX pin current enabling to control LED peak current, turn it on and off.
- Constant specified load current, which is maintained within the wide range of input voltages from 50V to 700V.

APPLICATIONS

- Flat panel display backlighting
- General-purpose constant current source
- Chargers

PIN CONFIGURATION**SO-8 PINOUT**

PIN	NAME	PARAMETER
1	EX	Output current, output power transistor turn-on/turn-off control input
2	V _{IN}	High-voltage supply input
3	OUT	Output power transistor drain
4	-	Not connected
5	-	Not connected
6	GND1	Output power transistor source
7	GND	Control circuit common
8	V _{DD}	VDD voltage

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**Absolute Maximum Ratings**

PARAMETER	RATINGS
V _{IN} to GND	-0.5 to +700V
Out to GND	-0.5 to +600V
EX	-0.3V to V _{DD} +0.3V
Operating Temperature Range	-40°C to +85°C
Junction Temperature	+125°C
Storage Temperature	-65°C to +150°C
Max LED Operating Current	Note1

Note 1. Maximum LED operating current should be selected based on the number of LEDs, V_{in}, thermal resistance of package, inductance. So for DIP-8 with R_{thja} = 120 °C / W, V_{in}=220VAC, V_{LED}=30V...50V - the recommended max average current is 200mA. Maximum output power is greatly influenced by ambient temperature and heat radiation condition. Check the Maximum output power using actual application circuit board.

ELECTRICAL CHARACTERISTICS(at T_A = 25°C, if not specified otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input voltage variation	V _{IN}		50		700	V
Current consumption in off-state	I _{IN_OFF}	V _{IN} =50V	-		0.6	mA
Power supply voltage variation	V _{DD}	V _{IN} = 50 to 700V, I _{DD} = 0	6.9		7.9	V
Input current in on-state	I _{IN_ON}	V _{IN} = 50 to 100V	-	0.3	1.0	mA
Circuit turn-on voltage	UVLO	V _{IN} growing		0.87*V _{DD}		V
Power supply voltage hysteresis	ΔUVLO	V _{IN} falling	300		1050	mV
EX pin turn-off voltage	V _{EX(hi)}		V _{DD} -1.3		V _{DD}	V
Output average current, at application circuit	I _O	V _{in} =220VAC, V _O =35V R _{ex} =178k, L=3.8mH		230		mA
Avg Current Accuracy at wafer testing	dI _O	V _{in} =30V, V _O =8.5V R _{ex} =370k, L=3.8mH	-4.5%		4.5%	%
Output peak current, at application circuit	I _{max}	V _{in} =220VAC, V _O =35V R _{ex} =178k, L=3.8mH		350		mA
Static drain-source ON state resistance	R _{DS_ON}	V _{IN} = 50V, I _{max} =0.3A		11		Ohm
Oscillator frequency	f _{osc}		40	52	65	kHz
Blanking interval	T _{blank}	V _{IN} = 50V	150		300	ns
Peak current turn-on delay	t _D		-		300	ns
Rising edge duration	t _{rise}		-		200	ns
Falling edge duration	t _{fall}		-		50	ns
Overtemperature protection: - Thermal shutdown junction temperature - Thermal shutdown hysteresis	T _J			115 10		°C

Note 1: see Fig.1

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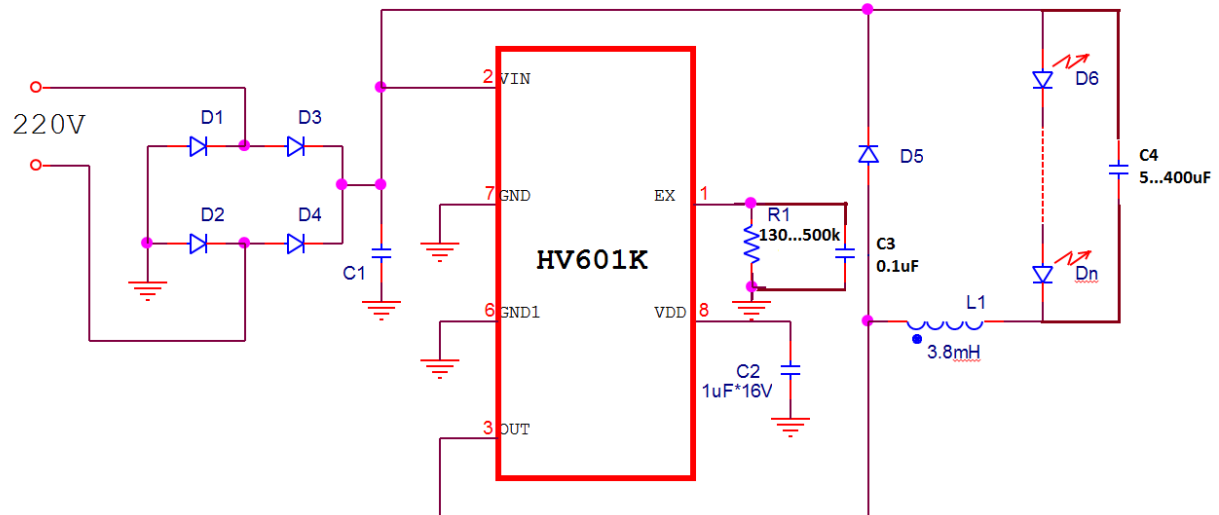
**HV601K APPLICATION CIRCUIT**

Fig.1

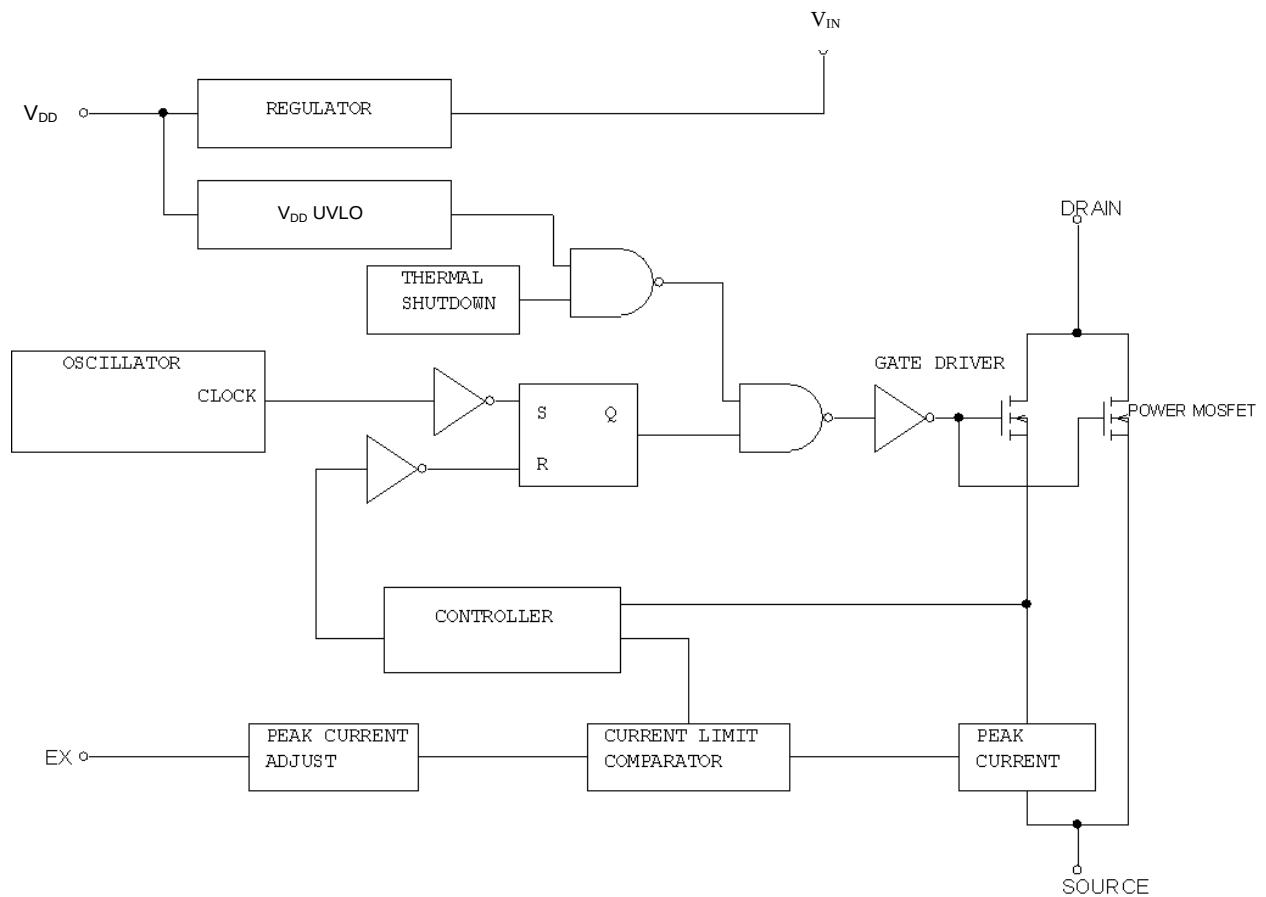
HV601K BLOCK-DIAGRAM

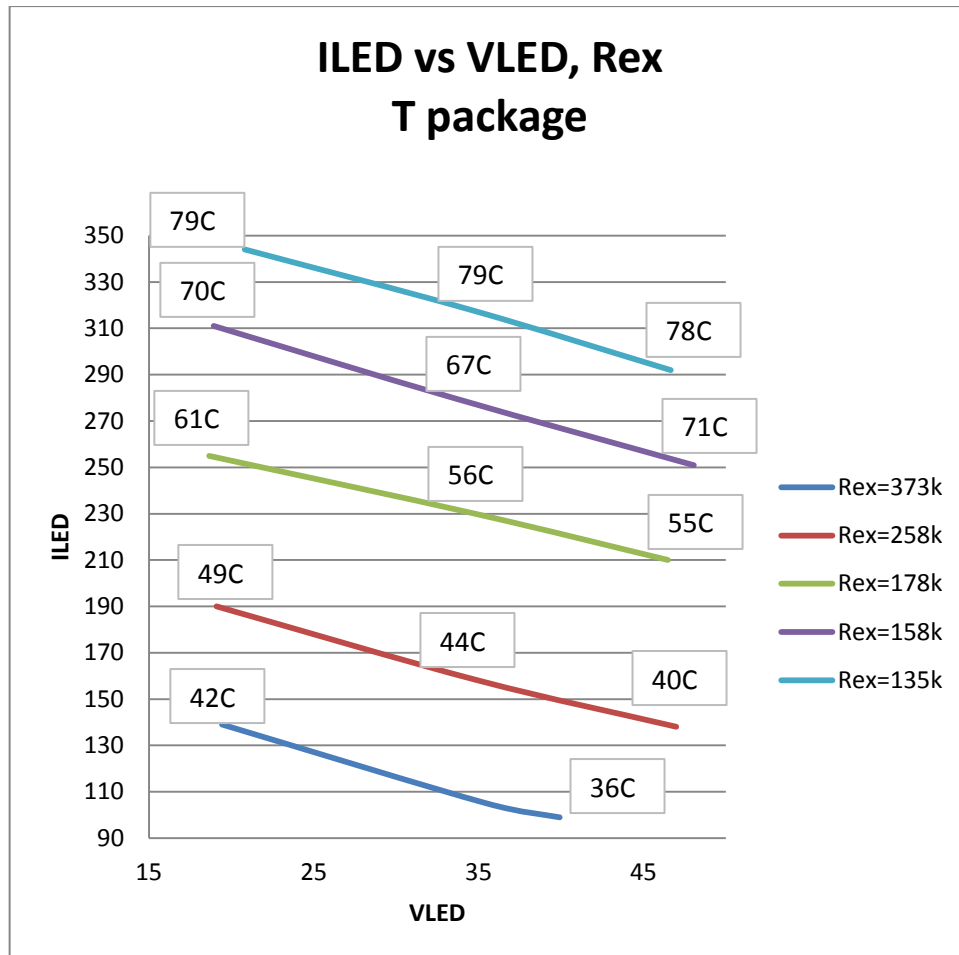
Fig.2

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**Typical Characteristic of HV601K**

HV601K

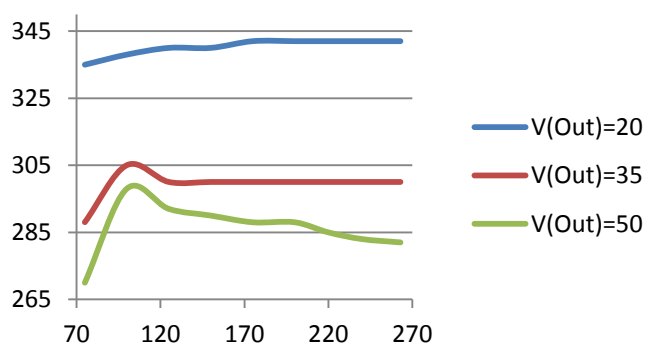
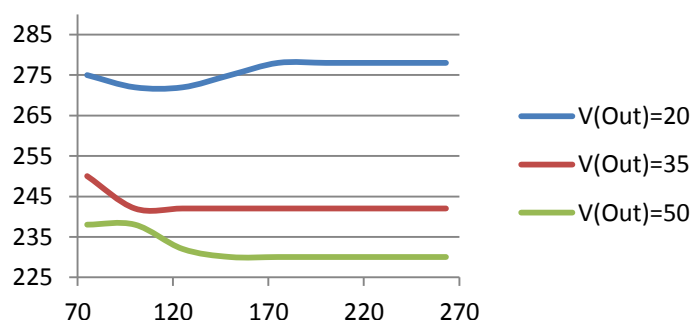
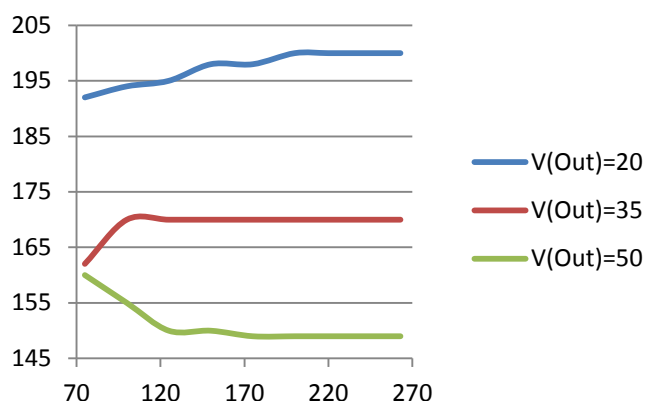
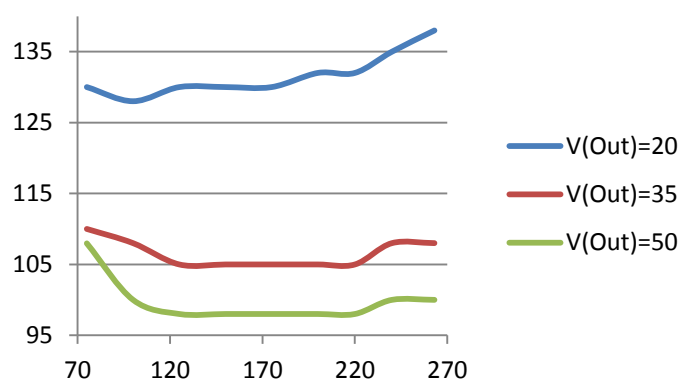
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Line Regulation I_{led} vs Vin (Vac)

R=131K

R=179K

R=258K

R=373K


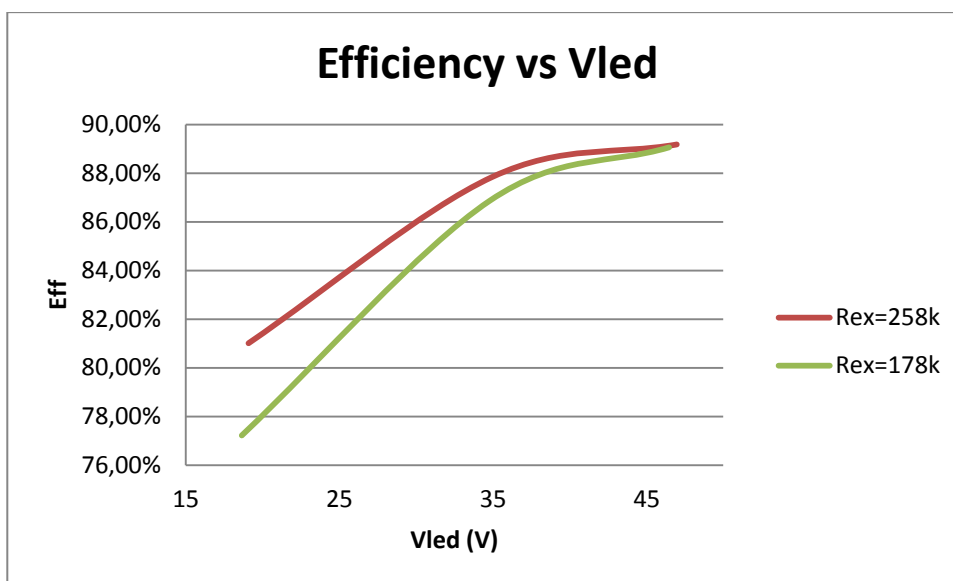
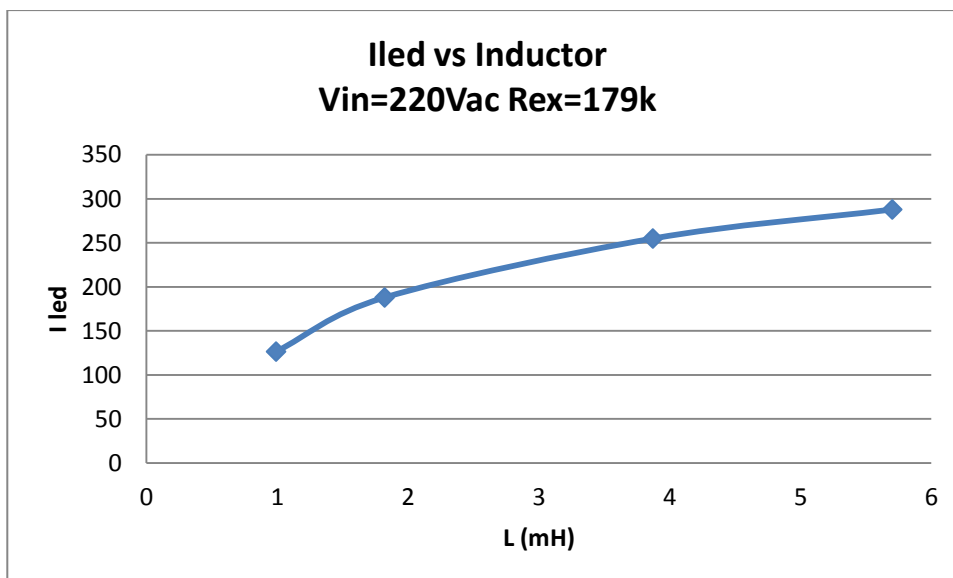
Peak Current at L=3.8mH, Vin=220Vac, V0=35V	
Rex (κOhm)	I _{peak} (mA)
131	440
178	350
258	270
373	200

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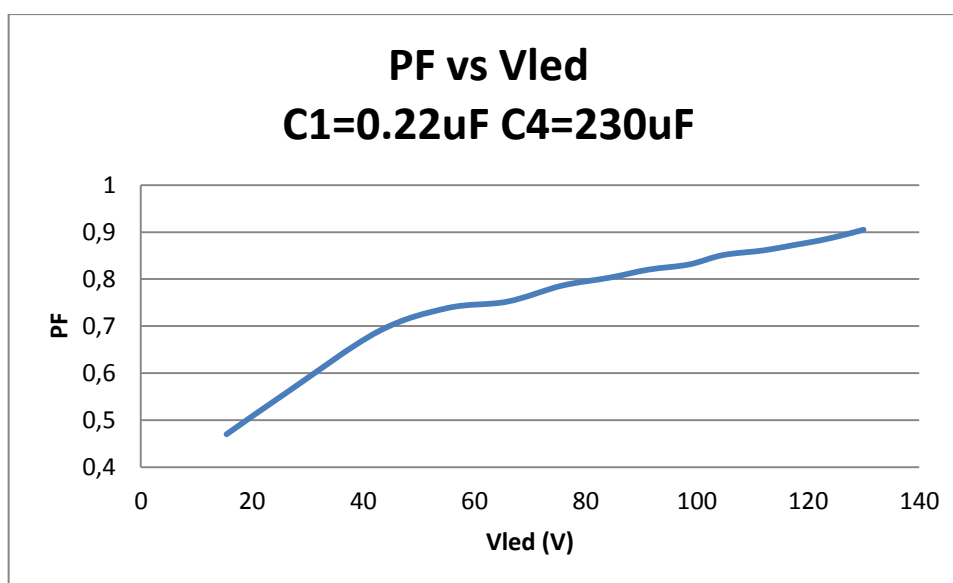
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**Power Factor.**

HV601K can be used to improve power factor. To do this, in the application circuit used a small input capacitance ($C1 = 0.22\mu\text{F}$) and big output capacitance ($C4 = 230\mu\text{F}$). The good results for the power factor are obtained for the large number of LEDs ($V_{\text{led}} > 80 \text{ V}$).

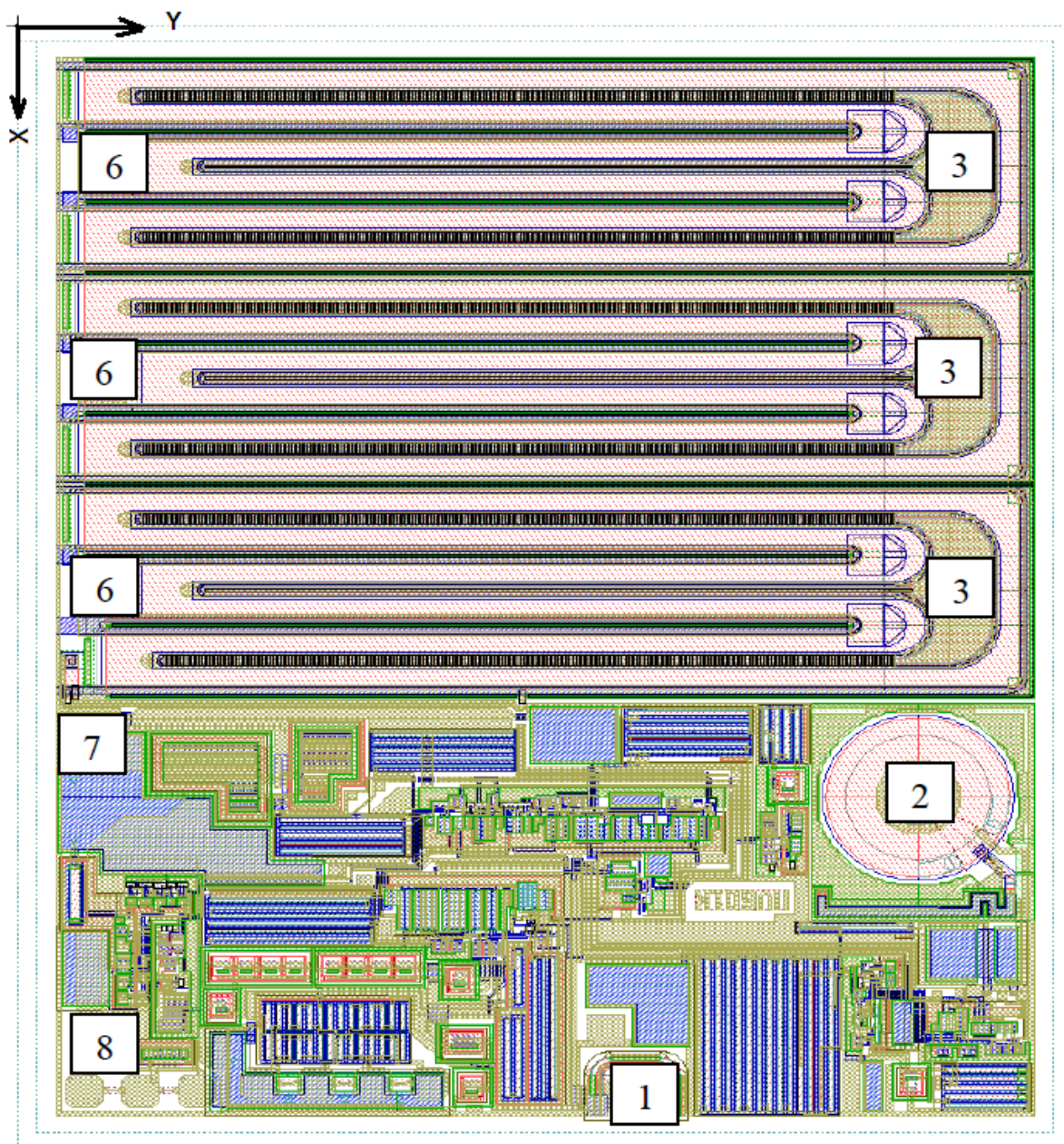


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**HV601K PAD LOCATION****Chip Size 2.77mm*2.25mm**

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PAD No.	PAD NAME	PAD CENTER, μm		PAD SIZE (passivation), μm	
		X	Y	X	Y
1	EX	2640	1318	92	92
2	V_{IN}	1904	1922	$\varnothing = 130$	
3 (three pads)	OUT	1392	2014	140	110
		870	2014	140	110
		348	2014	140	110
6 (three pads)	GND1	348	180	110	80
		870	180	110	80
		1392	180	110	80
7	GND	1768	152	92	92
8	V_{DD}	2497	182	92	92

HV601K BONDING DIAGRAM
PACKAGE DIP-8

