

## Electronic Line Switch

### Features

- ▶ 15Ω maximum switch resistance
- ▶ Current limiting protection
- ▶ 4 logic control inputs
- ▶ Operates at 2V input
- ▶ 2μA maximum quiescent current at 100V

### Applications

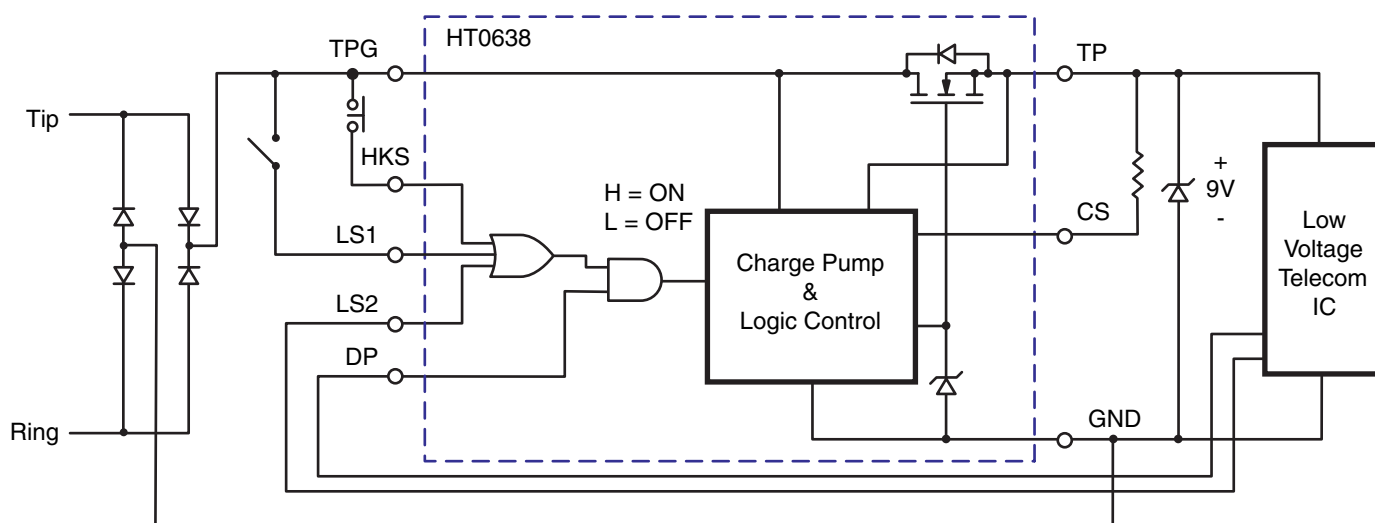
- ▶ Telephone handsets
- ▶ Fax machines
- ▶ Answering machines
- ▶ Auto-dial alarm systems

### General Description

The Supertex HT0638 is an integrated, electronic line switch controllable from four logic-level inputs. This device is intended as a replacement for mechanical hook switches and relays in telephones, answering machines, and similar telecommunications equipment. It switches the positive (Tip) side of the telephone line using control inputs that are referenced to the negative (Ring) side of the line. In the off state, it can hold-off 375 volts. In the on state, the series resistance is 15Ω maximum. This device provides adjustable current limiting via an external sense resistor. Three of the control inputs are general purpose and one is an override input that forces the switch to an off state regardless of the state of the other inputs. This override input is useful for 'flash' and pulse dialing purposes. Internal pull-up/down resistors allow the inputs to be driven from single-ended sources, push-pull sources, or left unconnected.

The HT0638 is powered by the telephone line, and so it is especially useful in applications where external power is not available. Due to its low quiescent current, this device exceeds the on-hook resistance requirements of the telecom standard EIA-470-A.

### Typical Application Circuit



## Ordering Information

Device	Package Options	
	8-Lead SOIC (Narrow Body)	
HT0638	HT0638LG	HT0638LG-G

-G indicates package is RoHS compliant ('Green')



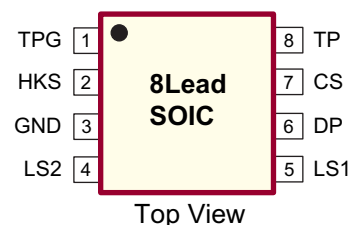
## Absolute Maximum Ratings

Parameter	Value
$V_{TPG}$ , Input line voltage	+375V
$V_{TP}$ , Output line voltage	+18V
HKS continuous input voltage	$V_{TPG}$
LS1, LS2 continuous input voltage	+20V
DP continuous input voltage	+5V
Storage temperature	-65°C to +150°C
Soldering temperature <sup>1</sup>	300°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

**Note 1.** Distance of 1.6mm from case for 10 seconds.

## Pin Configuration

DC Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$V_{TPG}$	High voltage positive supply	-	-	375	V	$I_{TP} = 10\mu\text{A}$ , HKS, LS1, LS2, DP = open circuit
$I_{TPQ}$	Input leakage current	-	-	2.0	$\mu\text{A}$	$V_{TPG} = 100\text{V}$ , HKS, LS1, LS2, DP = open circuit
		-	-	10		$V_{TPG} = 375\text{V}$ , HKS, LS1, LS2, DP = open circuit
$V_{TP}$	Output voltage	16	18	20	V	$V_{TPG} = 50\text{V}$ , No Load
$R_{SW}$	TPG to TP switch resistance	-	-	15	$\Omega$	$V_{TPG} = 4.3\text{V}$ , $I_{TPG} = 180\text{mA}$ , SW = On
		-	-	15		$V_{TPG} = 3.0\text{V}$ , $I_{TPG} = 20\text{mA}$ , SW = On, $T_A = 0^\circ\text{C}$ to $50^\circ\text{C}$
		-	-	30		$V_{TPG} = 2.0\text{V}$ , $I_{TPG} = 5\text{mA}$ , SW = On $T_A = 0^\circ\text{C}$ to $50^\circ\text{C}$
$I_{TPG} - I_{TP}$	Bias current	-	-	50	V	$V_{TPG} = 5.0\text{V}$ , SW = On
		-	-	100		$V_{TPG} = 10\text{V}$ , SW = On
$I_{LIM}$	$I_{TPG}$ current limiting	200	-	300	mA	$R_{EXT} = 430\Omega$
$I_{HKS}$	HKS input current	-	-	200	$\mu\text{A}$	$V_{HKS} = 50\text{V}$
$I_{LS1}$	LS1 input current	-	-	136	$\mu\text{A}$	$V_{LS1} = 3.0\text{V}$ , $V_{DP} = 0\text{V}$
$I_{LS2}$	LS2 input current	-	-	136	$\mu\text{A}$	$V_{LS2} = 3.0\text{V}$ , $V_{DP} = 0\text{V}$
$I_{DP}$	DP output current	-	-	500	$\mu\text{A}$	$V_{DP} = 0\text{V}$ , $V_{HKS} = 50\text{V}$ , $V_{LS1} = V_{LS2} = 3.0\text{V}$

## Electrical Characteristics (cont.)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$V_{IL(HKS)}$	HKS input low	0	-	0.2	V	---
$V_{IH(HKS)}$	HKS input high	2.0	-	$V_{TPG}$	V	---
$V_{IL(LS1)}$ , $V_{IL(LS2)}$	LS1 and LS2 input low	0	-	0.2	V	---
$V_{IH(LS1)}$ , $V_{IH(LS2)}$	LS1 and LS2 input high	1.0	-	20	V	---
$V_{IL(DP)}$	DP input low	0	-	0.2	V	---
$V_{IH(DP)}$	DP input high	1.0	-	5.0	V	---
$T_{ON}$	Turn on time	-	-	1.0	ms	$V_{TPG} = 4.5V$
$T_{OFF}$	Turn off time	-	-	1.0	ms	$V_{TPG} = 4.5V$

## Logic Truth Table

HKS	LS1	LS2	DP	Switch State
X	X	H	H or Z	ON
X	H	X	H or Z	ON
H	X	X	H or Z	ON
L or Z	L or Z	L or Z	X	OFF
X	X	X	L	OFF

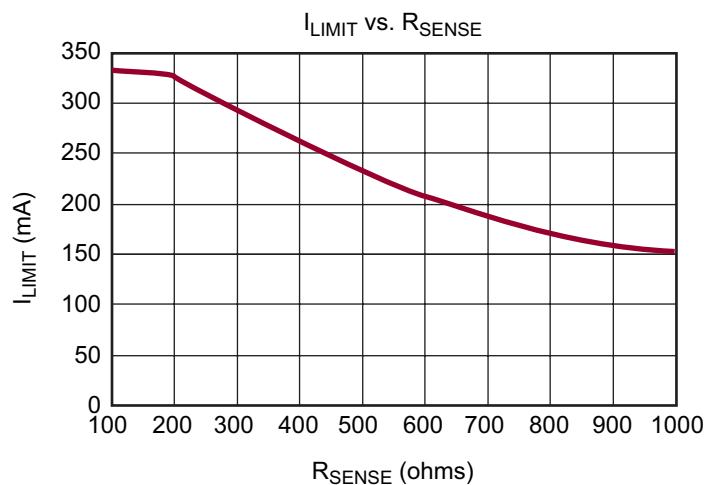
Z = high impedance, open circuit

X = don't care

L = logic level low

H = logic level high

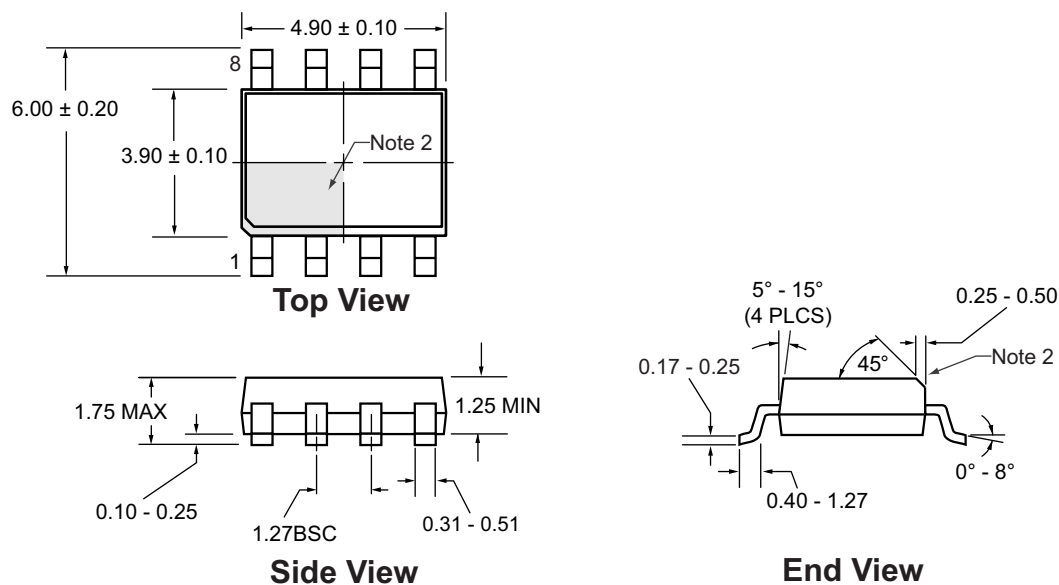
## Typical Performance Curve



## Pin Description

Pin	Name	Description
1	TPG	Positive input side of a telephone line, typically Tip side.
2	TP	Positive output side of a telephone line.
3	HKS	Hookswitch input. Connect HKS to TPG to turn on the electronic switch. Internally pulled low.
4	LS1	Line switch 1 input. Positive input turns on the electronic switch. Internally pulled low.
5	LS2	Line switch 2 input. Positive input turns on the electronic switch. Internally pulled low.
6	DP	Dial pulse input. A low input turns off the electronic switch. Use for pulse dialing. Internally pulled high.
7	CS	Current sense input. An external resistor connected between CS and TP sets the current limit. Short CS to TP if current limiting is not used.
8	GND	Device ground. Negative side of a telephone line, typically Ring side.

## 8-Lead SOIC (Narrow Body) LG Package Outline



### Notes:

1. All dimensions in millimeters. Angles in degrees.
2. If the corner is not chamfered, then a Pin 1 identifier must be located within the area indicated.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to <http://www.supertex.com/packaging.html>.)

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