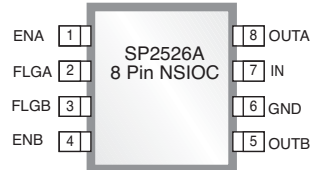**Sipex**

SP2526A

Dual USB High-Side Power Switch

FEATURES

- ■ +3.0V to +5.5V Input Voltage Range
- ■ Two Independent Power Switches
- ■ Two Error Flag Outputs, Open Drain
- ■ 2.6V Undervoltage Lockout
- ■ 1.25A Short Circuit Current Limit
- ■ 150mΩ Maximum On-Resistance
- ■ 110μA On-State Supply Current
- ■ 1μA Shutdown Current
- ■ Output Can Be Forced Higher Than Input (Off-State)
- ■ Thermal Shutdown
- ■ 1ms Soft-Start Power Up, Fast Turn Off

```
         ┌─────────────┐
ENA  1 ──┤             ├── 8  OUTA
FLGA 2 ──┤  SP2526A    ├── 7  IN
FLGB 3 ──┤ 8 Pin NSIOC ├── 6  GND
ENB  4 ──┤             ├── 5  OUTB
         └─────────────┘
```

Now Available in Lead Free Packaging

- ■ Active-High Version: SP2526A-1
- ■ Active-Low Version: SP2526A-2

APPLICATIONS

- ■ USB Power Management
- ■ Hot Plug-In Power Supplies
- ■ Battery Charger Circuit

DESCRIPTION

The SP2526A device is a dual +3.0V to +5.5V USB Supervisory Power Control Switch ideal for self-powered and bus-powered Universal Serial Bus (USB) applications. Each switch has low on-resistance (110mΩ typical) and can supply 500mA minimum. The fault currents are limited to 1.0A typical and the flag output pin for each switch is available to indicate fault conditions to the USB controller. The thermal shutdown feature will prevent damage to the device when subjected to excessive current loads. The undervoltage lockout feature will ensure that the device will remain off unless there is a valid input voltage present.

TYPICAL APPLICATION CIRCUIT
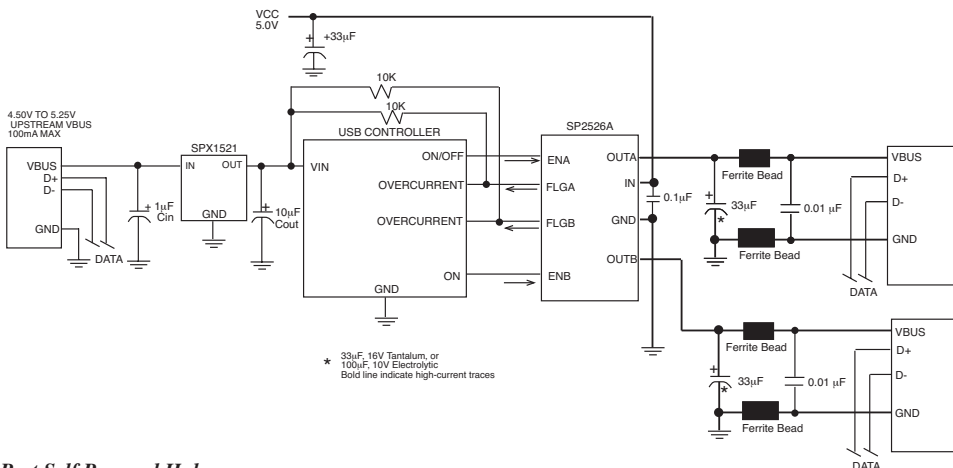
Two Port Self Powered Hub

ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

Supply Voltage(V_{IN})...7.0V
Fault Flag Voltage (V_{FLG})..................................7.0V
Fault Flag Current (I_{FLG})..................................50mA
Enable Control Input (V_{EN}).....................-0.3V -15V

Operating Temperature Range.............-40°C to +85°C
Maximum Junction Temperature ....125°C
Storage Temperature Range..............-65°C to +150°C
Soldering Temperature (10 sec.)........................260°C
Power Dissipation Per Package
8-pin NSOIC (derate 6.14mW/°C above +70°C)..........500mW

ELECTRICAL CHARACTERISTICS

Unless otherwise noted, the following specifications apply for V_{IN} = +5.0V, T_A = 25°C.

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Supply Current		0.75 110	5.0 160	µA	V_{EN} = Logic "0" OUT = Open V_{EN} = Logic "1" OUT = Open
Enable Input Voltage	0.8	1.7 2.0	2.4	V	V_{EN} = Logic "0" V_{EN} = Logic "1"
Enable Input Current		0.01 0.01	1 1	µA	V_{EN} = Logic "0" V_{EN} = Logic "1"
Enable Input Capacitance		1		pF	
Output Mosfet Resistance		110	150	mΩ	
Output Turn-On Delay		100		µs	R_L=10Ω each output
Output Turn-On Rise Time		1000	4000	µs	R_L=10Ω each output
Output Turn-Off Delay		0.8	20	µs	R_L=10Ω each output
Output Turn-Off Fall Time		0.7	20	µs	R_L=10Ω each output
Output Leakage Current			10	µA	
Current Limit Threshold	0.6	1.0	1.25	A	
Over-Temperature Shutdown Threshold		135 125		°C	T_J increasing T_J decreasing
Error Flag Output Resistance		10 15	25 40	Ω	V_{IN} = 5V,I_L = 10mA V_{IN} = 3.3V,I_L = 10mA
Error Flag Off Current		0.01	1	µA	V_{FLAG} = 5V
UVLO Threshold		2.6 2.4		V	V_{IN} increasing V_{IN} decreasing

SP2526A Dual USB High-Side Power Switch

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PIN DESCRIPTION

Pin Number	Pin Name	Description
1	ENA	Enable Input for MOSFET Switch A. This input pin is active high for the SP2526A-1 and active low for the SP2526A-2
2	FLGA	An active-low and open-drained fault flag output fot channel A. It can indicate current limit when ENA is active. In normal mode operation (ENA or/and ENB is active), it also can indicate thermal shudown or undervoltage.
3	FLGB	An active-low and open-drained fault flag output fot channel B. It can indicate current limit when ENB is active. In normal mode operation (ENA or/and ENB is active), it also can indicate thermal shudown or undervoltage.
4	ENB	Enable Input for MOSFET Switch B. This input pin is active high for the SP2526A-1 and active low for the SP2526A-2
5	OUTB	Output for MOSFET Switch Channel B. This is the output pin of the MOSFET source of channel B, typically connected to the switched side of the load.
6	GND	Ground.
7	IN	Power supply input
8	OUTA	Output for MOSFET Switch Channel A. This is the output pin of the MOSFET source of channel A, typically connected to the switched side of the load.

TEST CIRCUIT
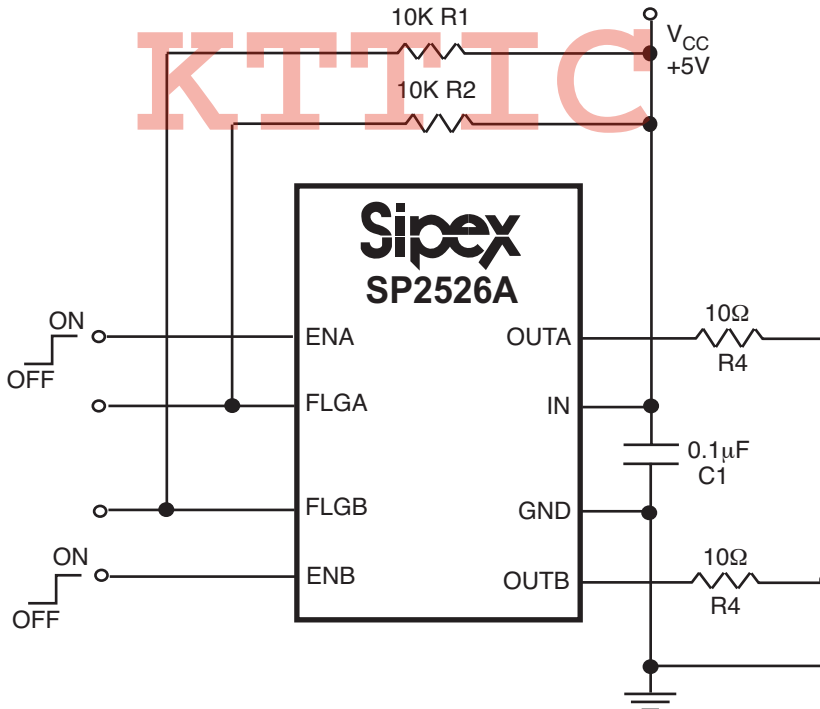
Error Flag
An open-drained output of an N-channel MOSFET, the FLG output is pulled low to signal the following fault conditions: input undervoltage, output current limit, and thermal shutdown.

Current Limit
The current limit threshold is preset internally. It protects the output MOSFET switches from damage resulting from undesirable short circuit conditions or excess inrush current, which is often encountered during hot plug-in. The low limit of the current limit threshold of the SP2526A allows a minimum current of 0.6A through the MOSFET switches. A current limit condition will signal the error flag.

Thermal Shutdown
When the chip temperature exceeds 135ºC for any reason other than overcurrent fault of either one of the two MOSFETs, the thermal shutdown function turns off both MOSFET switches and signals the error flag. A hysteresis of 10ºC prevents the MOSFETs from turning back on until the chip temperature drops below 125ºC. However, if thermal shutdown is triggered by chip temperature rise resulting from overcurrent fault condition of either one of the MOSFET switches, the thermal shutdown function will only turn off the switch that is in overcurrent condition and the other switch can still remain its normal operation. In other words, the thermal shutdown function of the two switches is independent of each other in the case of overcurrent fault.

Supply Filtering
A 0.1µF to 1µF bypass capacitor from IN to GND, located near the device, is strongly recommended to control supply transients. Without a bypass capacitor, an output short may cause sufficient ringing on the input (from supply lead inductance) to damage internal control circuitry.

Transient Requirements
USB supports dynamic attachment (hot plug-in) of peripherals. A current surge is caused by the input capacitance of downstream device. Ferrite beads are recommended in series with all power and ground connector pins. Ferrite beads reduce EMI and limit the inrush current during hot-attachment by filtering high-frequency signals.

Short Circuit Transient
Bulk capacitance provides the short-term transient current needed during a hot-attachment event. A 33 µF,16V tantalum or a 100µF,10V electrolytic capacitor mounted close to downstream connector each port should provide transient drop protection

Printed Circuit Layout
The Power circuitry of USB printed circuit boards requires a customized layout to maximize thermal dissipation and to minimize voltage drop and EMI.
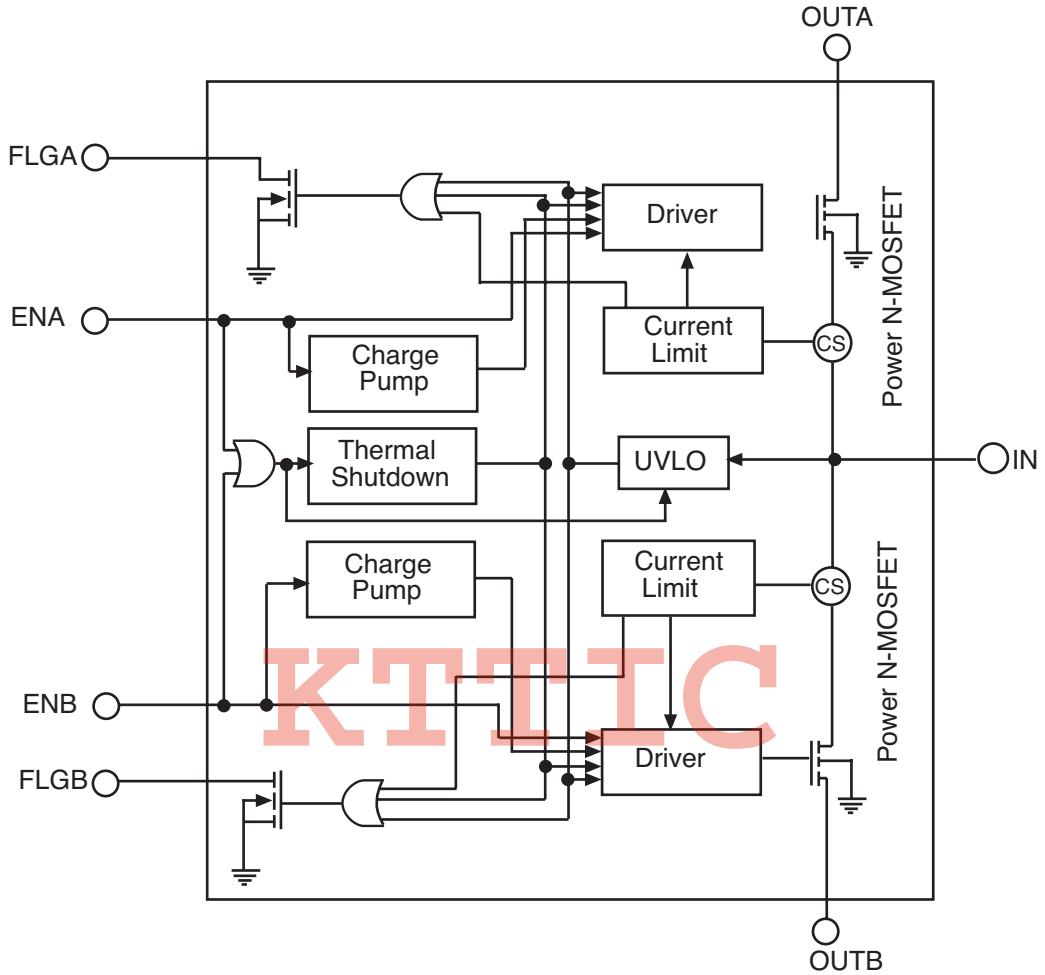
V_{IN} = +5.0V, single MOSFET switch section, and T_{AMB} = +25°C unless otherwise noted.
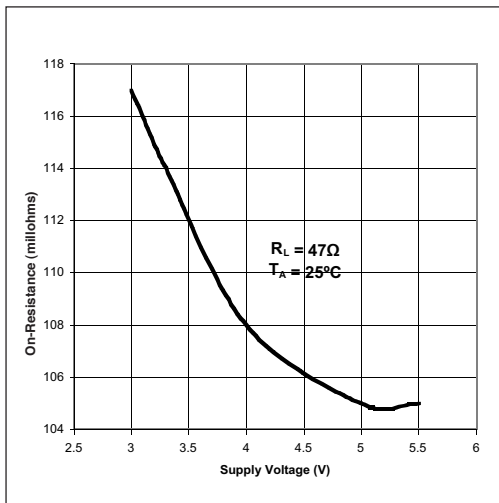

Figure 1. Output On-Resistance vs. Supply Voltage
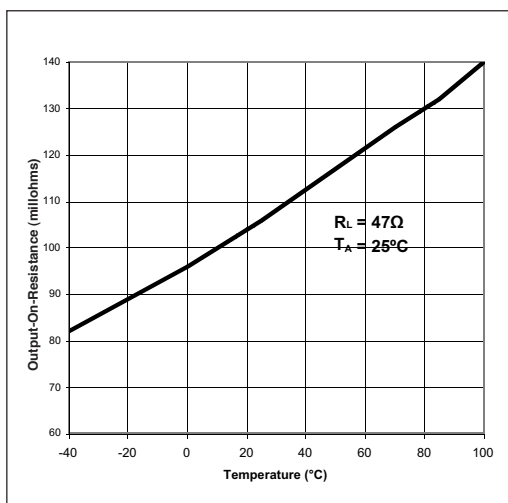

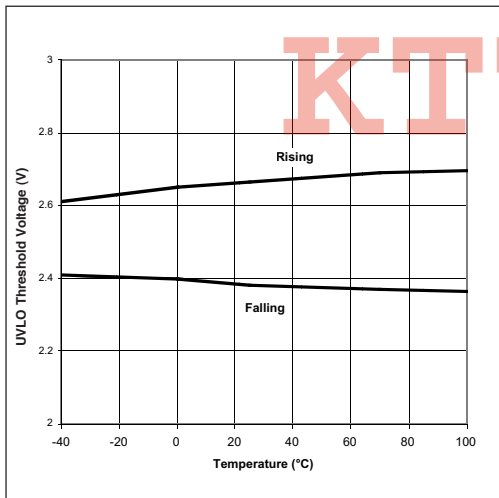*Figure 2. Output On-Resistance vs. Temperature*
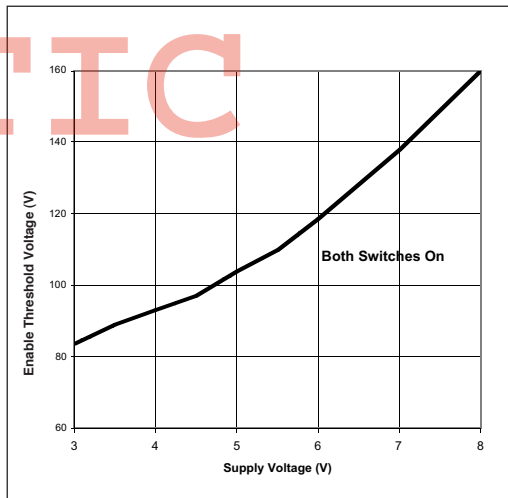

Figure 3. UVLO Threshold Voltage vs. Temperature

Figure 4. On-state Supply Current vs. Supply Voltage

V_{IN} = +5.0V, single MOSFET switch section, and T_{AMB} = +25°C unless otherwise noted.
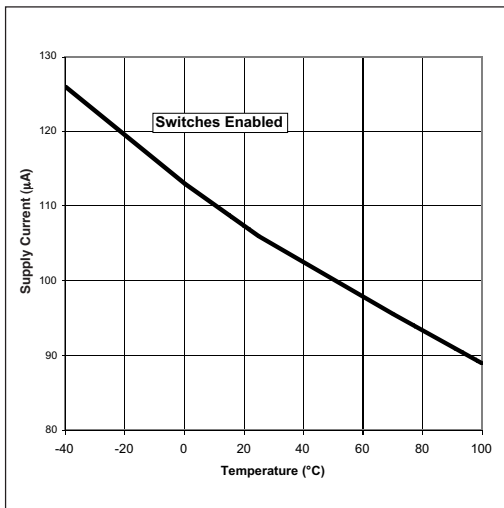

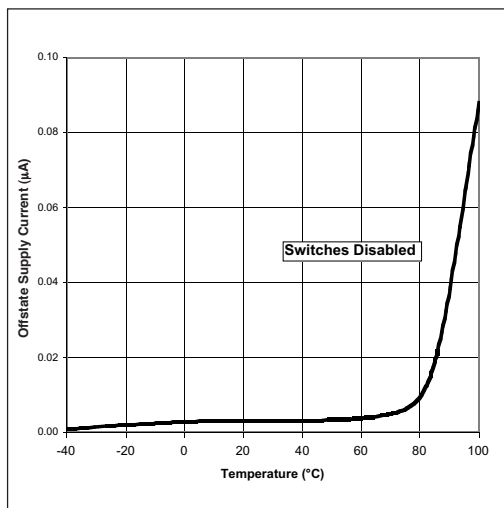*Figure 5. On-state Supply Current vs. Temperature*

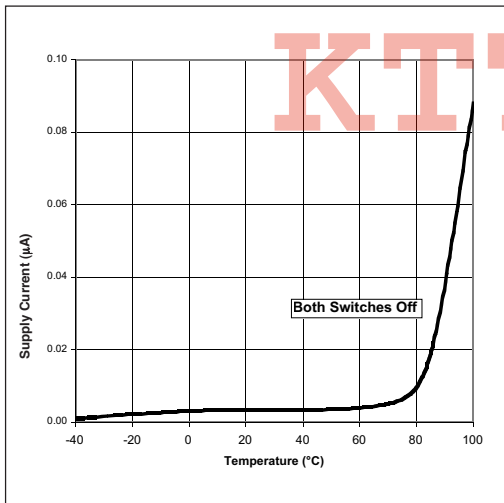*Figure 6. Off-state Supply Current vs. Temperature*

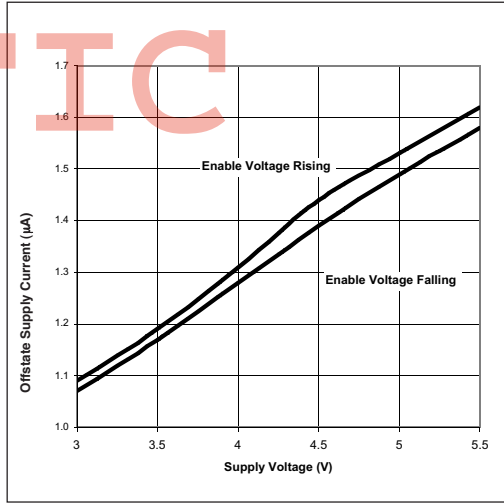*Figure 7. Off-state Supply Current vs. Supply Voltage*

Figure 8. Control Threshold vs. Supply Voltage

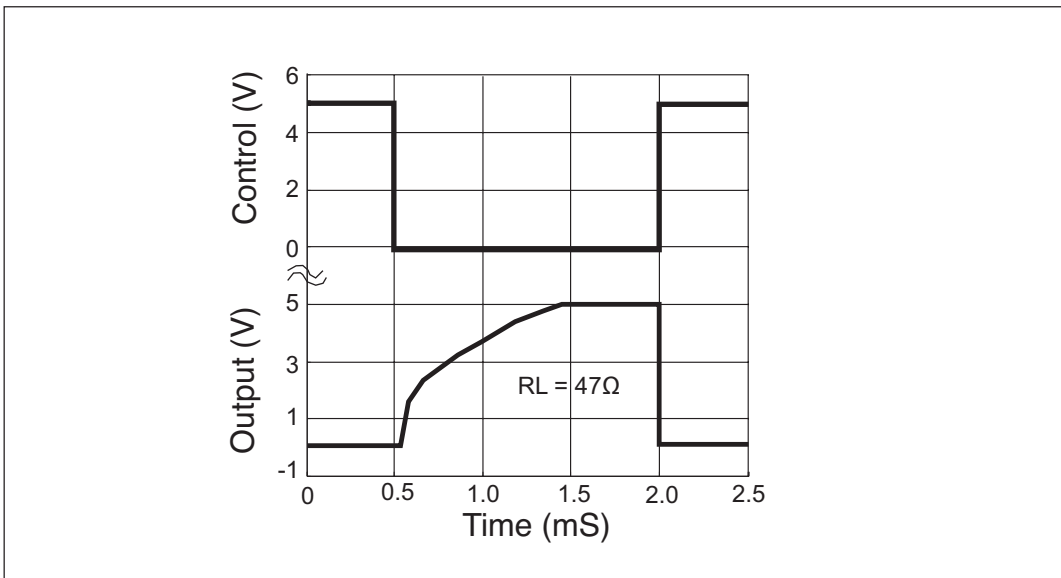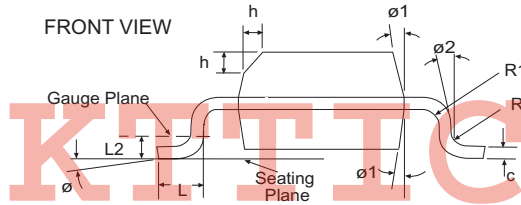V_{IN} = +5.0V, single MOSFET switch section, and T_{AMB} = +25°C unless otherwise noted.

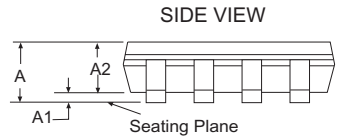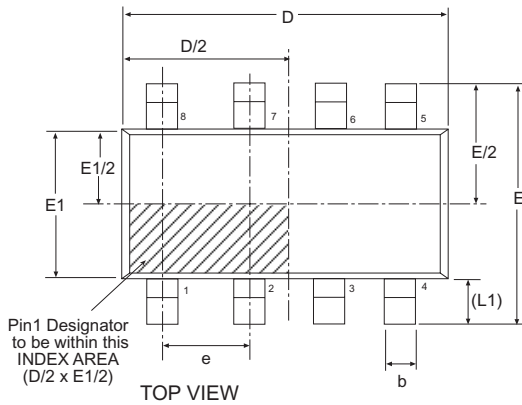*Figure 9. Turn-on/Turn-off Characteristics*

TOP VIEW

SIDE VIEW

Pin1 Designator to be within this INDEX AREA (D/2 x E1/2)

Seating Plane

FRONT VIEW

Gauge Plane

Seating Plane

8 Pin NSOIC	JEDEC MS-012		Variation AA		
SYMBOL	Dimensions in Millimeters: Controlling Dimension			Dimensions in Inches Conversion Factor: 1 Inch = 25.40 mm	
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	-	1.75	0.053	-	0.069
A1	0.10	-	0.25	0.004	-	0.010
A2	1.25	-	1.65	0.049	-	0.065
b	0.31	-	0.51	0.012	-	0.020
c	0.17	-	0.25	0.007	-	0.010
E	6.00 BSC			0.236 BSC		
E1	3.90 BSC			0.154 BSC		
e	1.27 BSC			0.050 BSC		
h	0.25		0.50	0.010	-	0.020
L	0.40	-	1.27	0.016	-	0.050
L1	1.04 REF			0.041 REF		
L2	0.25 BSC			0.010 BSC		
R	0.07	-	-	0.003	-	-
R1	0.07	-	-	0.003	-	-
ø	0º	-	8º	0º	-	8º
ø1	5º	-	15º	5º	-	15º
ø2	0º	-	-	0º	-	-
D	4.90 BSC			0.193 BSC		
SIPEX Pkg Signoff Date/Rev:				JL Aug16-05 / Rev A		

http://www.kttic.com

ORDERING INFORMATION

Part Number	Temperature Range	Package Types
SP2526A-1EN	-40°C to +85°C	8-pin NSOIC
SP2526A-1EN/TR	-40°C to +85°C	8-pin NSOIC
SP2526A-2EN	-40°C to +85°C	8-pin NSOIC
SP2526A-2EN/TR	-40°C to +85°C	8-pin NSOIC

Available in lead free packaging. To order add "-L" suffix to part number.

Example: SP2526A-1EN/TR = standard; SP2526A-1EN-L/TR = lead free.

/TR = Tape and Reel

Pack quantity is 2,500 for NSOIC.

KTTIC

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