

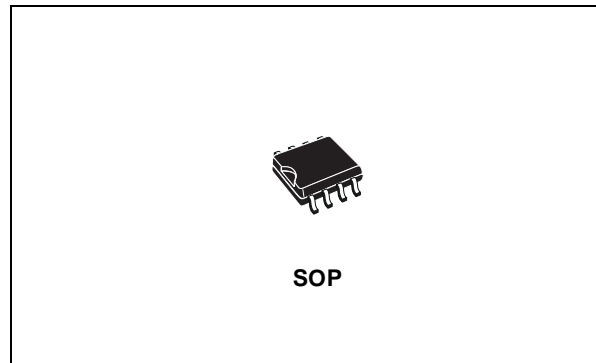


## CURRENT LIMITED POWER DISTRIBUTION SWITCHES

- 80mΩ HIGH-SIDE MOSFET SWITCH
- 500mA CONTINUOUS CURRENT PER CHANNEL
- INDEPENDENT THERMAL AND SHORT-CIRCUIT PROTECTION WITH OVERCURRENT LOGIC OUTPUT
- OPERATING RANGE FROM 2.7V TO 5.5V
- CMOS- AND TTL-COMPATIBLE ENABLE INPUTS
- 2.5ms TYPICAL RISE TIME
- UNDERVOLTAGE LOCKOUT
- 10μA MAXIMUM STANDBY SUPPLY CURRENT
- AMBIENT TEMPERATURE RANGE, 0°C TO 85°C
- ESD PROTECTION

### DESCRIPTION

The ST2042 power distribution switches is intended for application where heavy capacitive loads and short circuits are likely to be encountered. These devices incorporate 80mΩ N-channel MOSFET high-side power switches for power-distribution systems that require multiple powers switches in a single package. Each switch is controlled by an independent logic enable input. Gate drive is provided by an internal charge pump designed to control the power-switch rise times and fall times to minimize current surges during



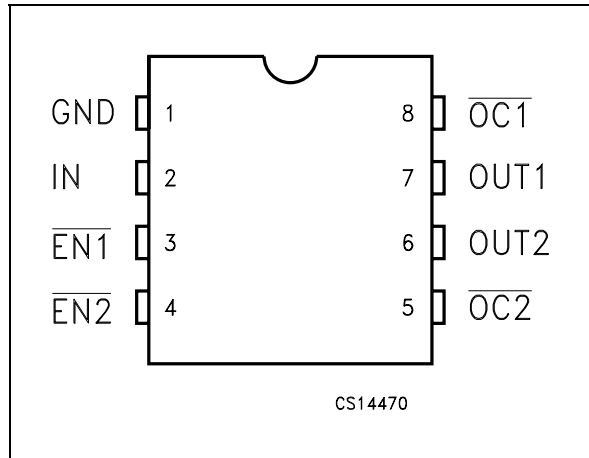
switching. The charge pump requires no external components and allows operation from supplies as low as 2.7 V.

When the output load exceeds the current-limit threshold or a short is present, these devices limit the output current to a safe level by switching into a constant-current mode, pulling the overcurrent ( $\overline{OCx}$ ) logic output low. When continuous heavy overloads and short circuits increase the power dissipation in the switch, causing the junction temperature to rise, a thermal protection circuit shuts off the switch to prevent damage. Recovery from a thermal shutdown is automatic once the device has cooled sufficiently. Internal circuitry ensures the switch remains off until valid input voltage is present. These power-distribution switches are designed to current limit at 0.9 A

### ORDERING CODES

Type	Temperature Range	Package	Comments
ST2042BD	-40 to 85 °C	SO-8 (Tube)	50parts per tube / 40tube per box
ST2042BDR	-40 to 85 °C	SO-8 (Tape & Reel)	2500 parts per reel

**PIN CONFIGURATION**



**PIN DESCRIPTION**

Pin N°	Symbol	Name And Function
1	GND	Ground
2	IN	Input Voltage
3	EN1	Enable Input. Logic Low Turns On Power Switch IN-OUT1
4	EN2	Enable Input. Logic Low Turns On Power Switch IN-OUT2
5	OC2	Overcurrent. Logic Output Active Low IN-OUT2
6	OUT2	Power Switch Output
7	OUT1	Power Switch Output
8	OC1	Overcurrent. Logic Output Active Low IN-OUT2

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_I$	Input Voltage Range (Note 1)	-0.3 to 6	V
$V_O$	Output Voltage Range (Note 1)	-0.3 to ( $V_I + 0.3$ )	V
$V_{IENX}$	Input Voltage Range	-0.3 to 6	V
$I_O$	Continuous Output Current	Internally Limited	
ESD	Electrostatic Discharge	2	kV
$T_J$	Operating Junction Temperature	-40 to 125	°C

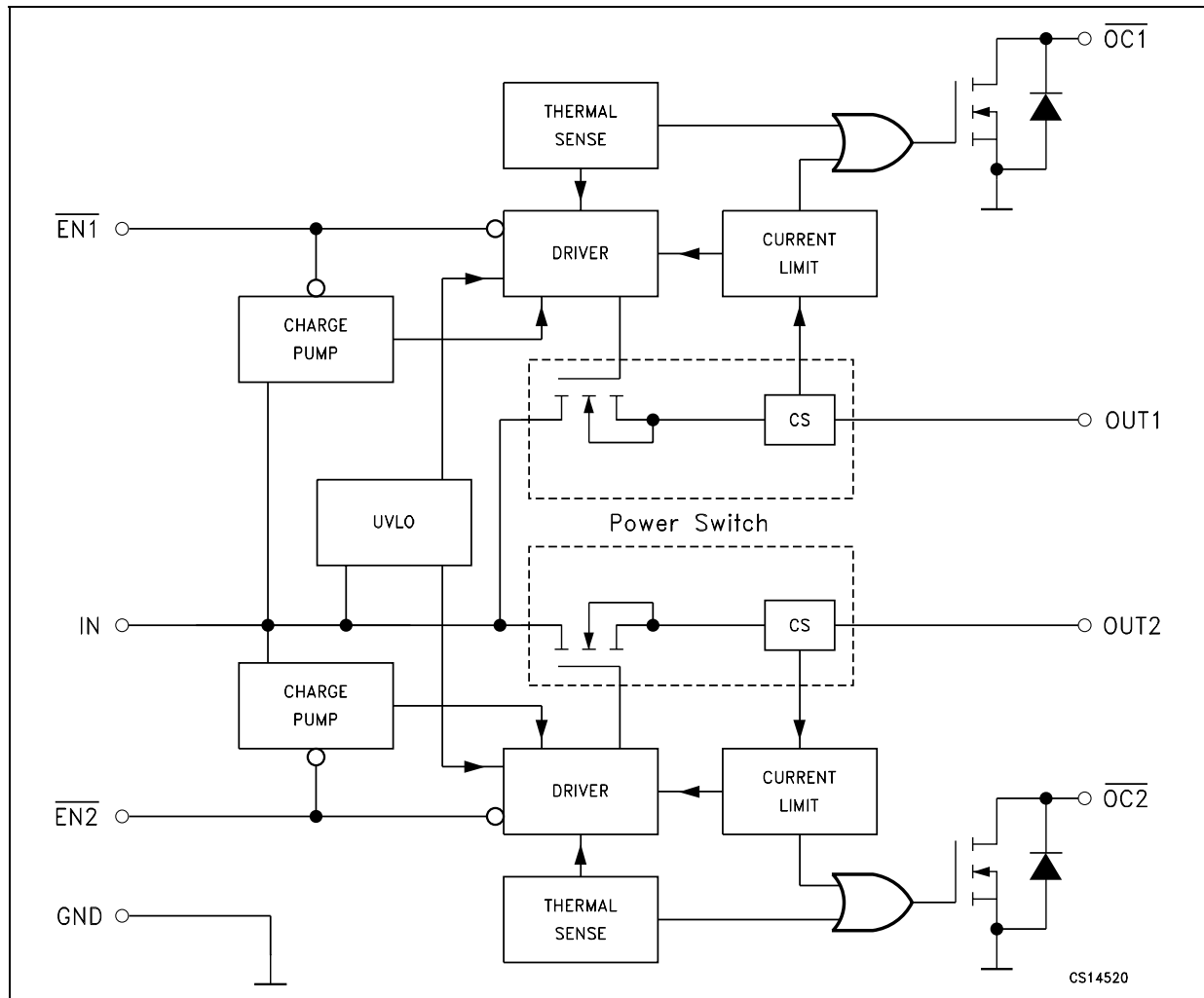
Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Note1: All voltage are referred to GND

**RECOMMENDED OPERATING CONDITION**

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_I$	Input Voltage Range (Note 1)	2.7		5.5	V
$V_O$	Output Voltage Range (Note 1)	0		5.5	V
$I_O$	Continuous Output Current (Per Switch)	0		500	mA

## BLOCK DIAGRAM



**POWER SWITCH ELECTRICAL CHARACTERISTICS** ( $V_I = 5.5V$ ,  $I_O = \text{rated current}$ ,  $V_{IEN} = 0V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.) (See Note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source ON-State Resistance	$V_I = 5V$ $I_O = 0.5A$		80	100	m $\Omega$
		$V_I = 5V$ $I_O = 0.5A$ $T_J = 85^\circ C$		90	120	
		$V_I = 5V$ $I_O = 0.5A$ $T_J = 125^\circ C$		100	135	
		$V_I = 3.3V$ $I_O = 0.5A$		90	125	
		$V_I = 3.3V$ $I_O = 0.5A$ $T_J = 85^\circ C$		110	145	
		$V_I = 3.3V$ $I_O = 0.5A$ $T_J = 125^\circ C$		120	160	
$t_r$	Output Rise Time	$V_I = 5.5V$ $R_L = 10\Omega$ $C_L = 1\mu F$		2.5		ms
		$V_I = 2.7V$ $R_L = 10\Omega$ $C_L = 1\mu F$		3		
$t_f$	Output Fall Time	$V_I = 5.5V$ $R_L = 10\Omega$ $C_L = 1\mu F$		0.3		ms
		$V_I = 2.7V$ $R_L = 10\Omega$ $C_L = 1\mu F$		0.2		

**ENABLE INPUT  $\overline{ENx}$  CHARACTERISTICS** ( $V_I = 5.5V$ ,  $I_O =$  rated current,  $V_{\overline{IEN}} = 0V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.) (See Note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{IH}$	High level Input Voltage	$V_I = 2.7V$ to $5.5V$	2			V
$V_{IL}$	Low level Input Voltage	$V_I = 4.5V$ to $5.5V$			0.8	V
		$V_I = 2.7V$ to $4.5V$			0.4	
$I_I$	Input Current	$V_{\overline{IENx}} = 0V$ or $V_I$	-0.5		0.5	$\mu A$
$t_{on}$	Turn-on Time	$R_L = 10\Omega$ $C_L = 100\mu F$			20	ms
$t_{off}$	Turn-off Time	$R_L = 10\Omega$ $C_L = 100\mu F$			40	ms

**CURRENT LIMIT CHARACTERISTICS** ( $V_I = 5.5V$ ,  $I_O =$  rated current,  $V_{\overline{IEN}} = 0V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.) (See Note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{OS}$	Short Circuit Output Current	$V_I = 5V$ , OUT connected to GND, device enabled into short circuit	0.7	1	1.3	A

**SUPPLY CURRENT CHARACTERISTICS** ( $V_I = 5.5V$ ,  $I_O =$  rated current,  $V_{\overline{IEN}} = 0V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.) (See Note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SOL}$	Current Low Level Output	$V_{\overline{IENx}} = V_I$ , No Load,		0.025	1	$\mu A$
		$V_{\overline{IENx}} = V_I$ , No Load, $T_J = -40$ to $125^\circ C$			10	
$I_{SOH}$	Current Low High Output	$V_{\overline{IENx}} = 0$ , No Load,		70	90	$\mu A$
		$V_{\overline{IENx}} = 0$ , No Load, $T_J = -40$ to $125^\circ C$			100	
$I_L$	Output Leakage Current	$V_{\overline{IENx}} = V_I$ , Output Connected to GND, $T_J = -40$ to $125^\circ C$			10	$\mu A$

**UNDERVOLTAGE CHARACTERISTICS** ( $V_I = 5.5V$ ,  $I_O =$  rated current,  $V_{\overline{IEN}} = 0V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.) (See Note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{IL}$	Low Level Input Voltage		2		2.5	V
$V_{HYS}$	Hysteresis			100		mV

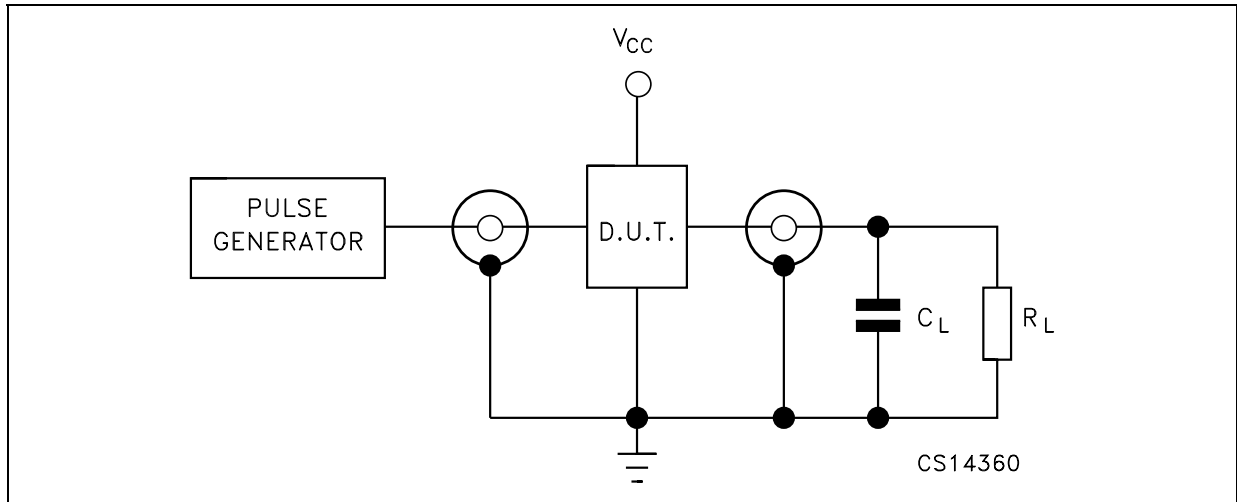
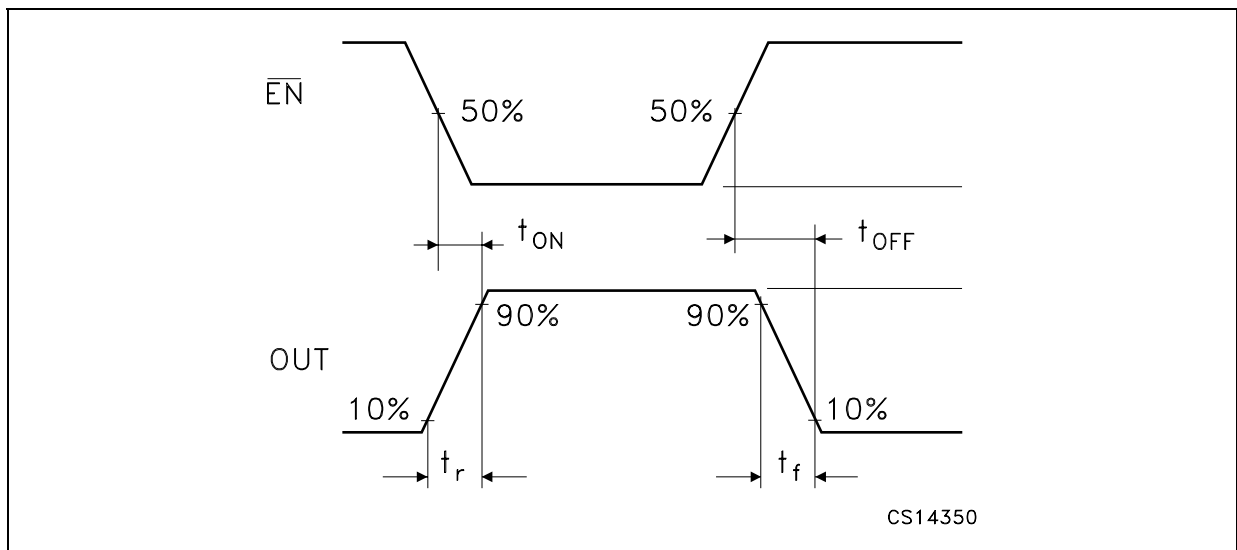
**OVERCURRENT ( $\overline{OC}$ ) CHARACTERISTICS** ( $V_I = 5.5V$ ,  $I_O =$  rated current,  $V_{\overline{IEN}} = 0V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.) (See Note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SINK}$	Sink Current	$V_O = 5V$	10			mA
$V_O$	Output Low Voltage	$I_O = 5mA$			0.5	V
$I_{OFF}$	OFF-State Current	$V_O = 5V$ $V_O = 3.3V$			1	$\mu A$

Note 1: Pulse testing techniques maintain junction temperature close to ambient temperature; thermal effect must be taken into account separately.

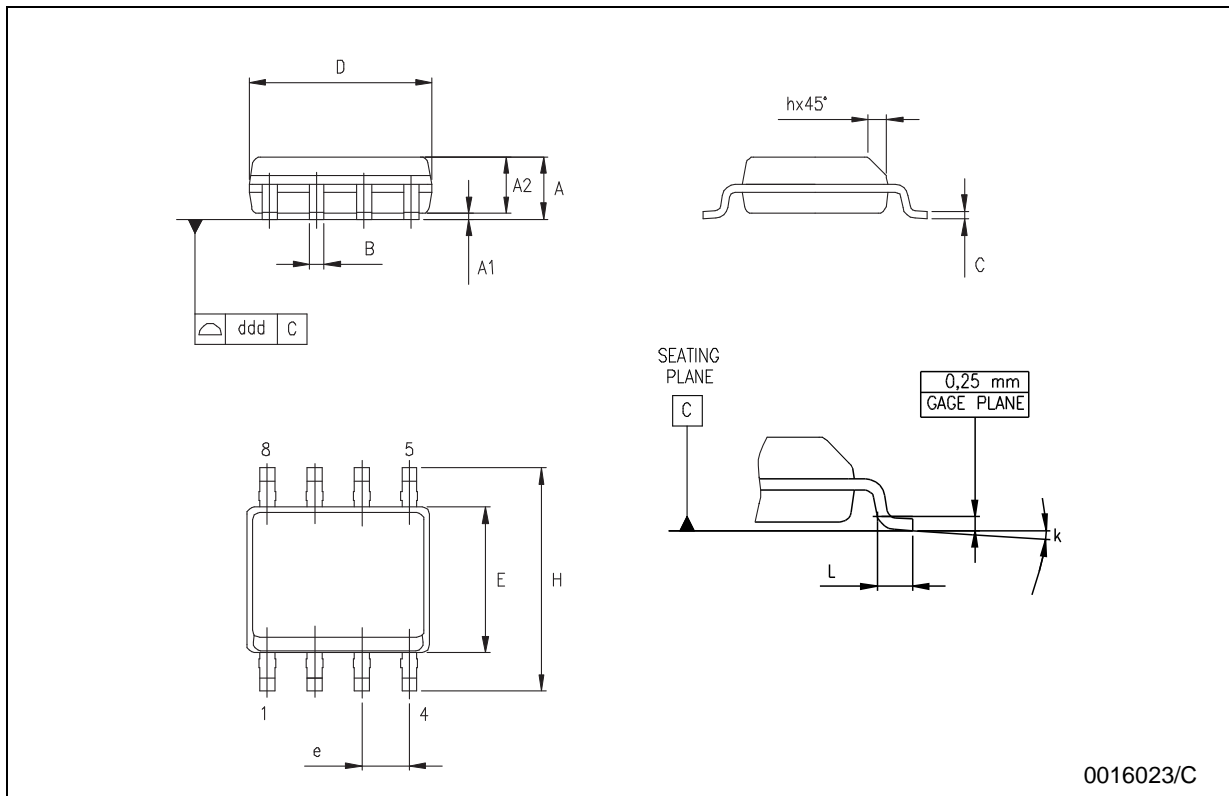
Note 2: Specified by design, not production tested.

## TEST CIRCUIT

WAVEFORM: PROPAGATION DELAYS ( $f=1\text{MHz}$ ; 50% duty cycle)

**SO-8 MECHANICAL DATA**

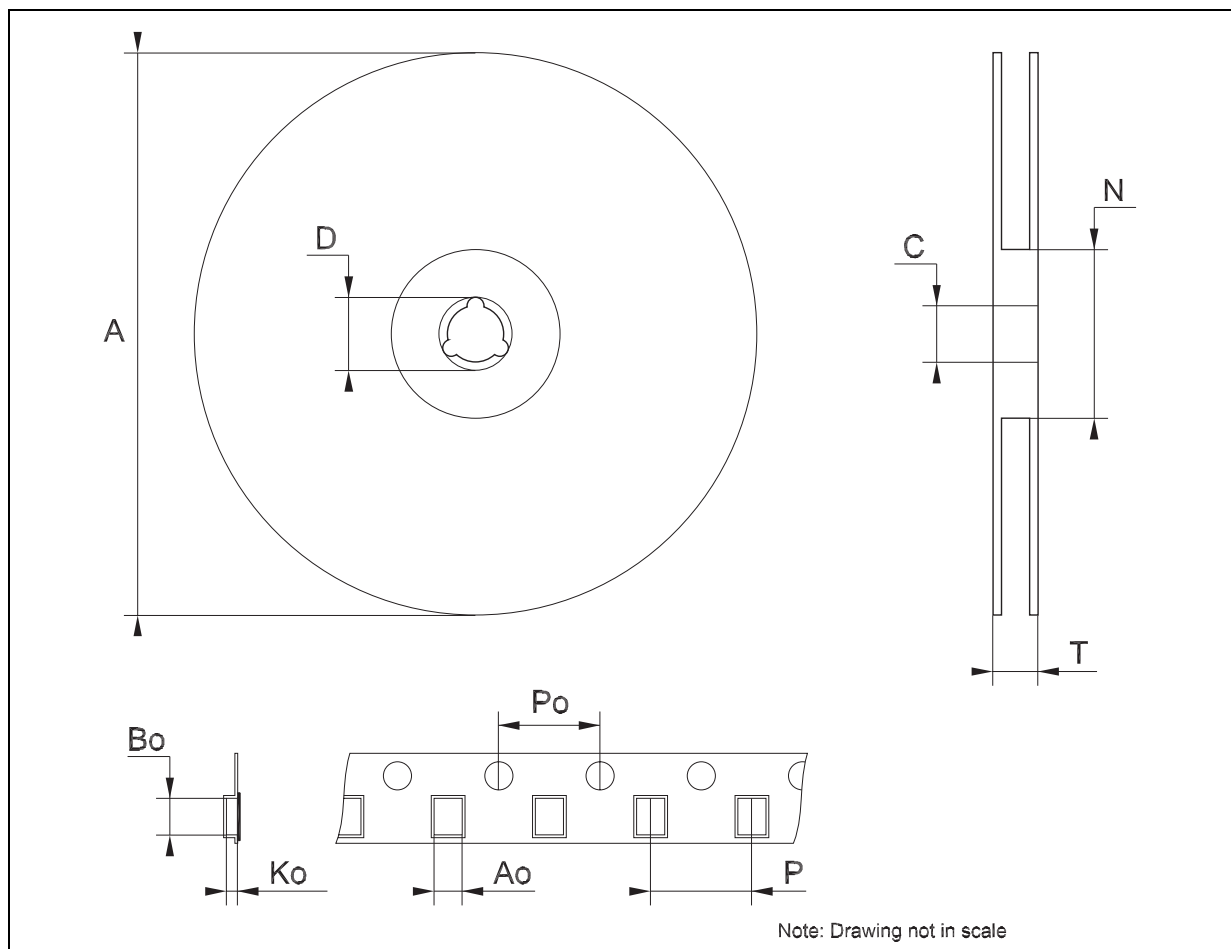
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



0016023/C

## Tape &amp; Reel SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics  
All other names are the property of their respective owners

© 2003 STMicroelectronics - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -  
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>