

WS3222D

Over-Voltage-Protection Load Switch with Adjustable OVLO threshold

[Http://www.willsemi.com](http://www.willsemi.com)

Descriptions

The WS3222 is an Over-Voltage-Protection (OVP) load switch with adjustable OVLO threshold voltage. The device will switch off internal MOSFET to disconnect IN to OUT to protect load when any of input voltage over the threshold.

When the OVLO input set below the external OVLO select voltage, the WS3222 automatically chooses the internal fixed OVLO threshold voltage. The over voltage protection threshold voltage can be adjusted with external resistor divider and the OVLO threshold voltage range is 4V~15V. The Over temperature protection (OTP) function monitors chip temperature to protect the device.

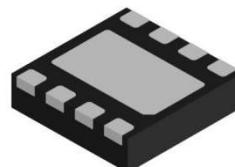
The WS3222 is available in DFN2×2-8L Package. Standard products are Pb-free and Halogen-free.

Features

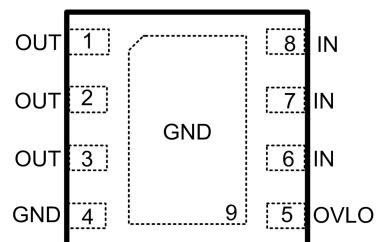
- Maximum input voltage : 29V
- Switch ON resistance : 40mΩ Typ.
- Ultra fast OVP response time : 450ns Typ.
- Adjust OVLO threshold voltage : 4V~15V

Applications

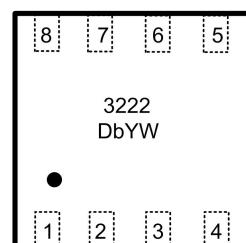
- Mobile Handsets and Tablets
- Portable Media Players
- STB, OTT
- Car DVR, Car Media System
- Peripherals



DFN2×2-8L (Bottom View)



Pin configuration (Top view)



Marking

D= Package code

b = Voltage code

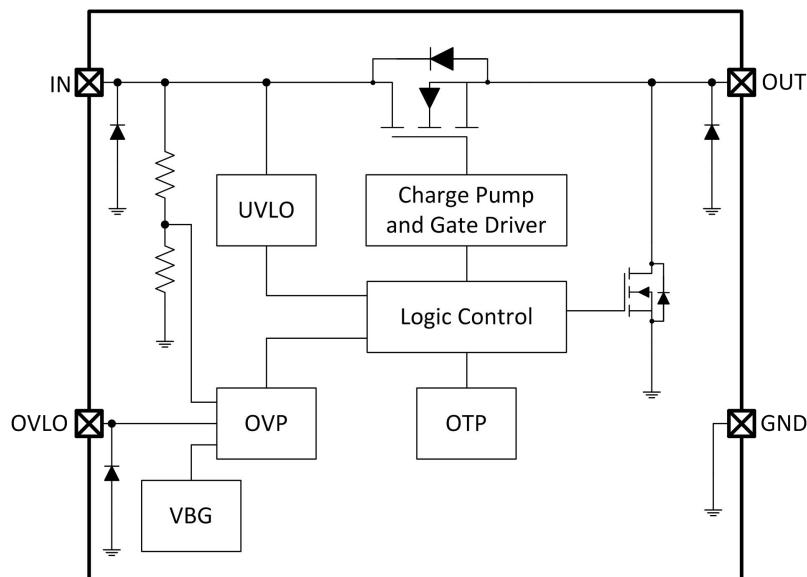
Y = Year code

W = Week code

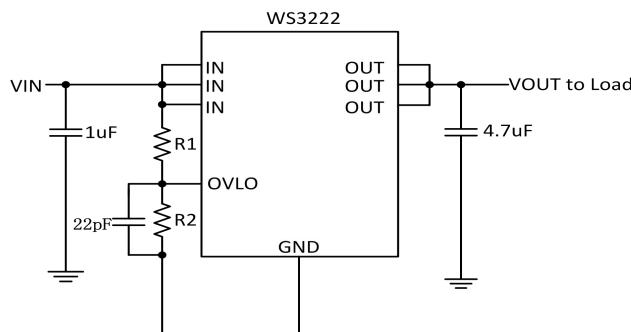
Order information

Device	Package	Shipping
WS3222D-8/TR	DFN2×2-8L	3000/Reel&Tape

Function Block Diagram



Typical Applications



Over Voltage Protect with External OVLO Threshold Setting

Note1: R1 and R2 are only required for External OVP, otherwise connect OVLO to GND

Note2: Recommend $10K \leq R2 \leq 50K$

Pin Descriptions

Pin No.	Symbol	Descriptions
1, 2, 3	OUT	Output
4	GND	Ground
5	OVLO	OVLO Threshold set pin. Connect a resistor-divider to set different OVLO threshold, $V_{OVLO} = 1.2 \times (1 + R1/R2)$ as shown typical application diagram.
6, 7, 8	IN	Input and Device Power Supply.
9	EXPOSED PAD	Connected to GND.

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input voltage (IN pin)	V _{IN}	-0.3 ~ 29	V
Output voltage (OUT pin)	V _{OUT}	-0.3 ~ 22	V
Input voltage (OVLO pin)	V _{OVLO}	-0.3~17	V
MAX Continuous Output current	I _{OUT}	3	A
Power dissipation *1 *3	P _D	0.5	W
Power dissipation *2 *3		0.3	W
Thermal resistance *1	R _{θJA}	250	°C/W
Thermal resistance *2		416	°C/W
Junction temperature	T _J	150	°C
Lead temperature(10s)	T _L	260	°C
Storage temperature	T _{stg}	-55 ~ 150	°C
ESD Ratings	HBM	±4000	V
	MM	±200	V

Note: These are stress ratings only. Stresses exceeding the ranges specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

*1: Surface mounted on FR-4 Board using 1 square inch pad size, dual side, 1oz copper

*2: Surface mounted on FR-4 board using minimum pad size, 1oz copper

*3: Power dissipation is calculated by $P_D = (V_{IN}-V_{OUT}) \times I_{OUT}$

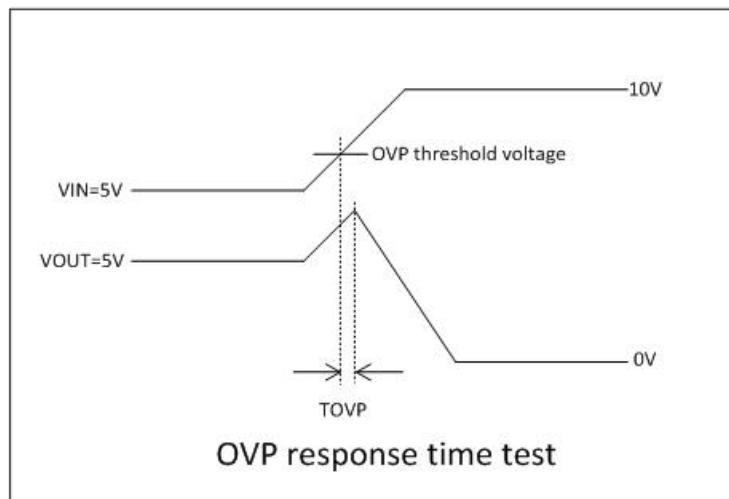
Recommend Operating Conditions (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Value	Unit
Input voltage	V _{IN}	2.5 ~ 28	V
Ambient operating temperature	T _A	-40 ~ 85	°C

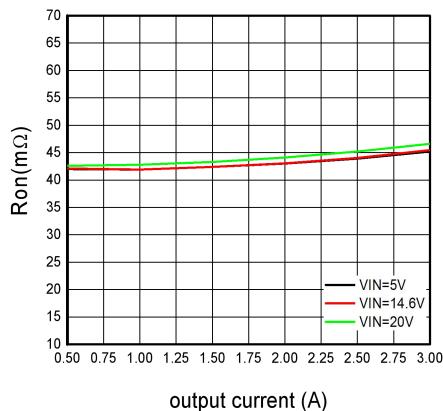
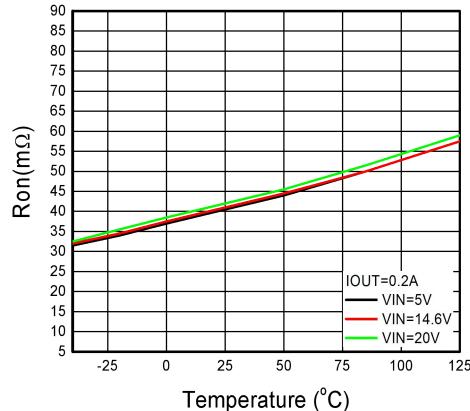
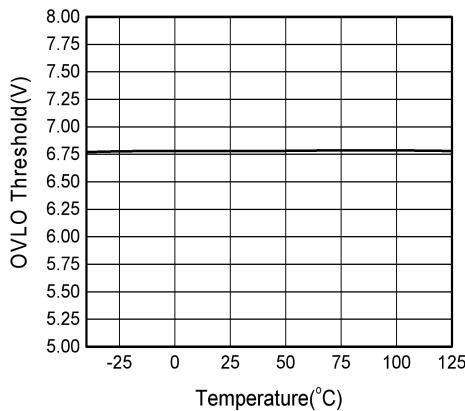
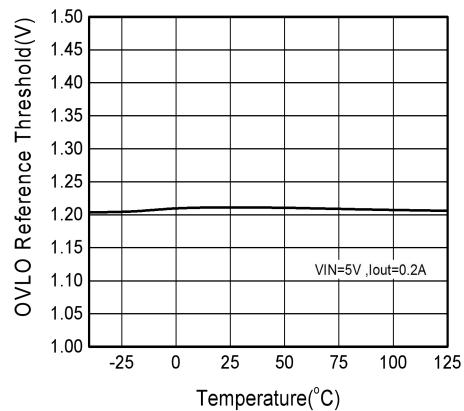
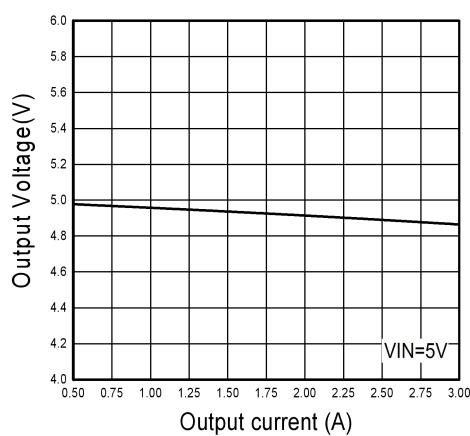
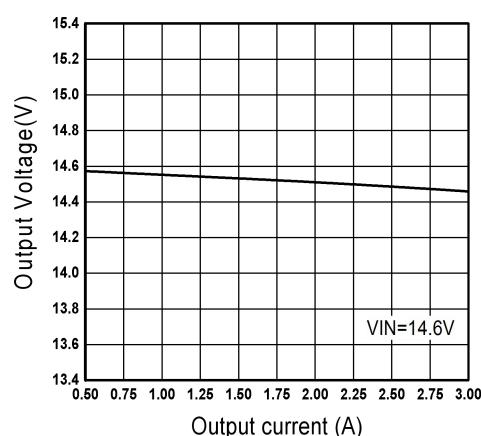
Electronics Characteristics($V_{IN}=5V$, $C_{IN}=1\mu F$, $C_{OUT}=4.7\mu F$, $T_a=25^\circ C$, unless otherwise noted)

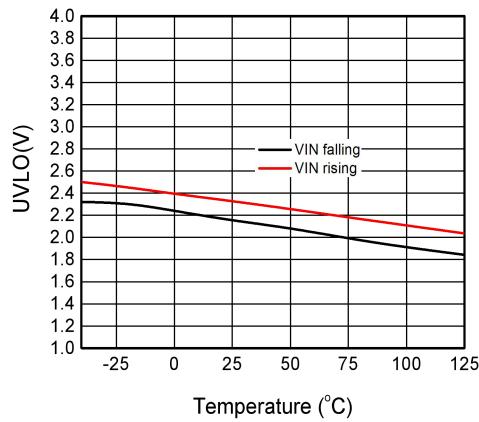
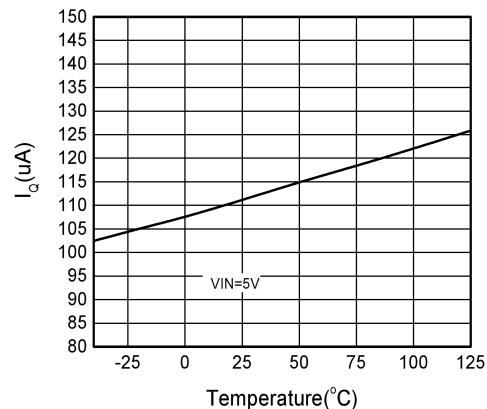
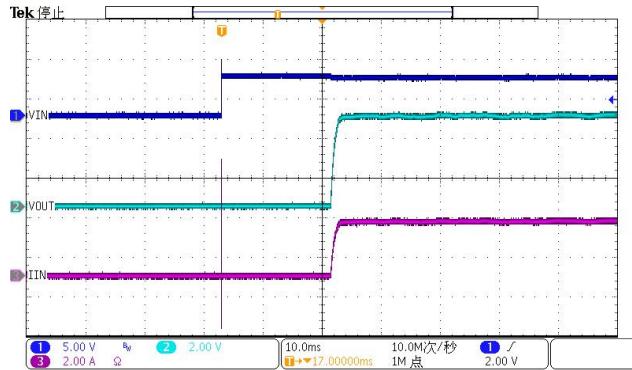
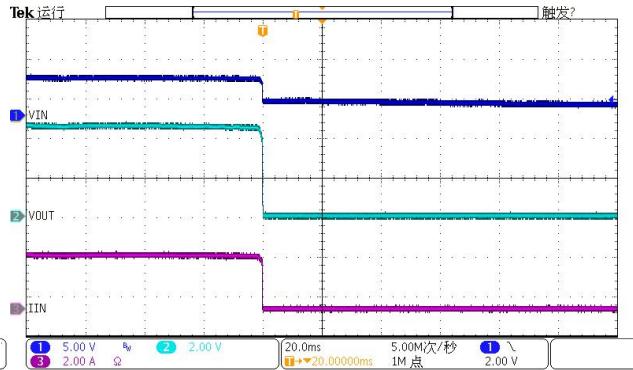
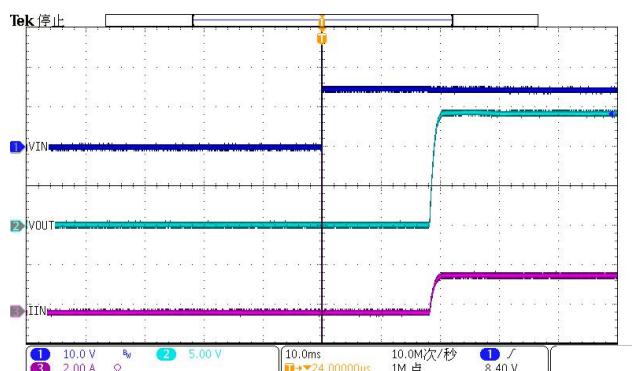
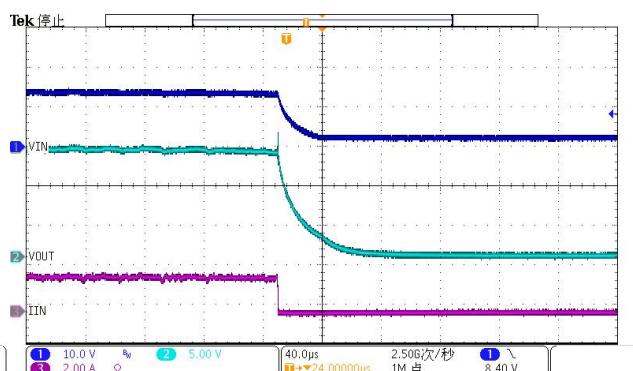
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input voltage range	V_{IN}		2.5		28	V
Quiescent current	I_Q	NO Load		110	200	uA
ON resistance	R_{ON}	$V_{IN}=5V$, $I_{OUT}=1A$		45		mΩ
OVP response time	T_{OVP}	V_{IN} rising, $C_{IN}=C_L=0pF$ *1		450		ns
OVLO reference voltage	V_{OVLO_TH}		1.17	1.2	1.23	V
	$V_{OVLO_HYS}^{*2}$			35		mV
Adjust OVP voltage range	V_{OVLO_RANGE}	V_{IN} rising	4		15	V
External OVLO select Threshold	V_{OVLO_SELECT}		0.2		0.3	V
UVLO threshold voltage	V_{UVLO}	V_{IN} rising		2.25	2.45	V
UVLO hysteresis voltage	V_{UVLO_HYS}	V_{IN} falling		0.25		V
Turn ON time	T_{ON}	$V_{IN}>UVLO$ to $V_{OUT}=V_{IN}*90\%$ $C_L=0$		16		ms
Output discharge resistance	R_{DCHG}	$V_{IN}=5V$		220		Ω
OTP threshold temperature	T_{OTP}	$V_{IN}=5V$		150		°C
OTP hysteresis temperature	T_{HYS}	$V_{IN}=5V$		20		°C

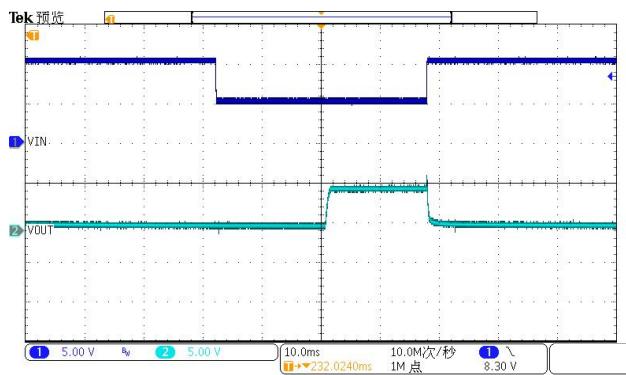
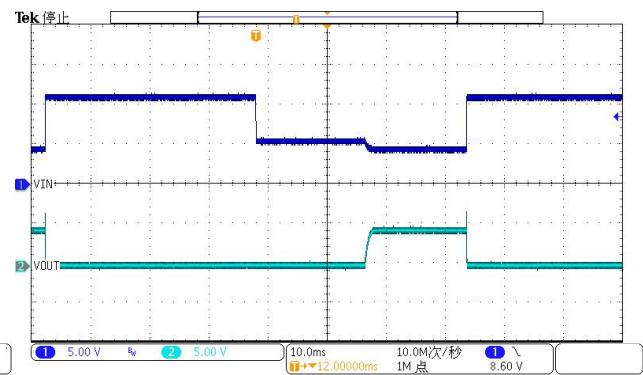
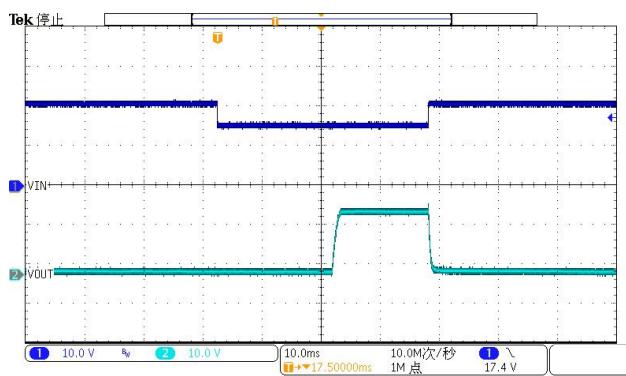
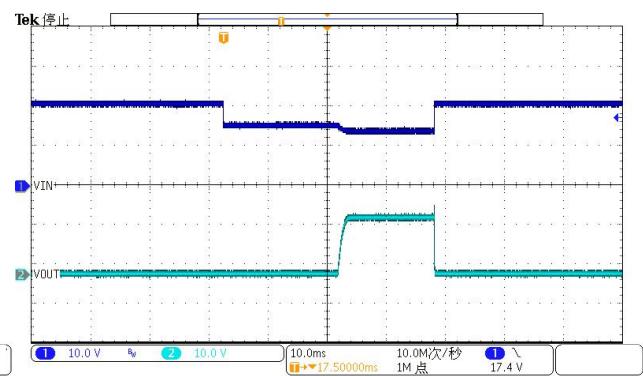
*1: Guaranteed by design

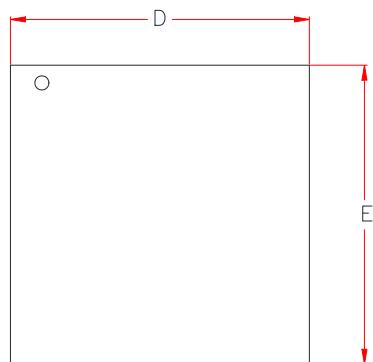


*2: If connect a resistor-divider to set different OVLO threshold, then $V_{OVLO_HYS} = 35 \times (1+R1/R2) mV$

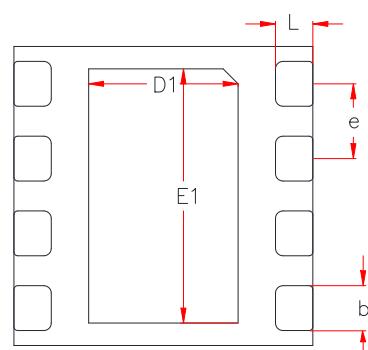
Typical Characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

ON Resistance vs. Load Current

ON Resistance vs. Temperature

OVLO Threshold vs. Temperature

OVLO Reference Threshold vs. Temperature

Output Voltage vs. Output Current

Output Voltage vs. Output Current


UVLO vs. Temperature

Quiescent Current vs. Temperature

Power-ON VIN=5V,IOUT=3A,Cout=1uf

Power-OFF VIN=5V,IOUT=3A,Cout=1uf

Power-ON VIN=14.6V, IOUT=2A,Cout=1uf

Power-OFF VIN=14.6V,IOUT=2A,Cout=1uf

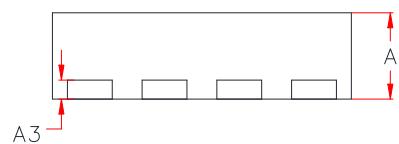

OVP and OVP Recovery(OVP=6.8V, Iout=0A)

OVP and OVP Recovery(OVP=6.8V, Iout=2.5A)

OVP and OVP Recovery(OVP=16V, Iout=0A)

OVP and OVP Recovery(OVP=16V, Iout=2A)

PACKAGE OUTLINE DIMENSIONS
DFN2x2-8L


TOP VIEW

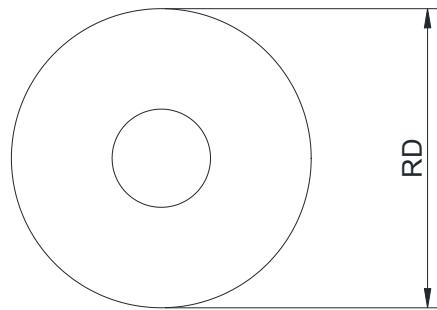
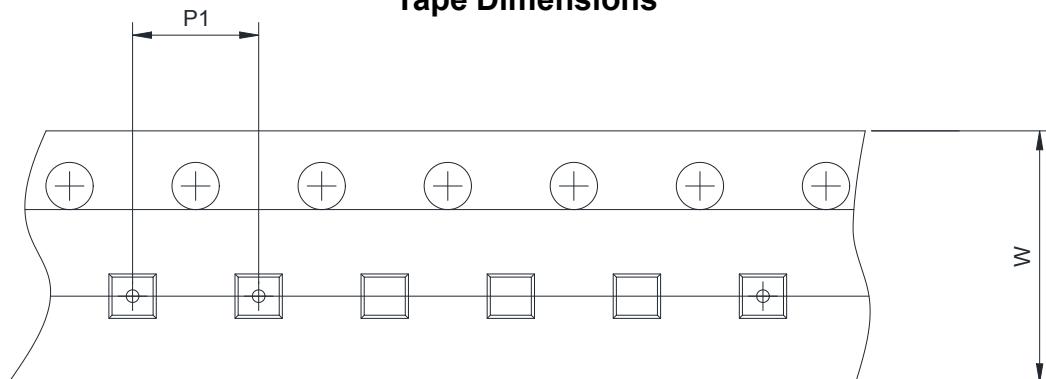
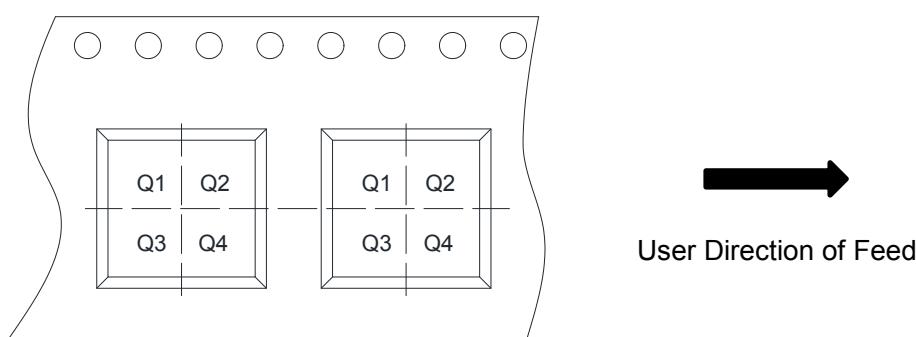


BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.52	0.55	0.58
A3		0.13 Ref.	
L	0.2	0.25	0.30
D	1.90	2.00	2.10
E	1.90	2.00	2.10
D1	0.90	1.00	1.10
E1	1.60	1.70	1.80
e		0.50 Typ.	
b	0.25	0.30	0.35

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch <input type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm <input type="checkbox"/> 12mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm <input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1 <input type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4