
RS16C30 Triple-Channel (N+M+O≤ 12 Phase) Step-Down Multiphase Controller with AVSBus and PMBus™ Interface

Features

- Native Trans-Inductor Voltage Regulator (TLVR) Support
 - No external passive components required
- Built-in 1kΩ current sense resistor
- Paired with ReedSemi Smart Power Stages or Modules for high density solutions
- Scalability and Flexibility
 - Scalable phase count: (12+0+0) to (9+2+1)
 - Flexible phase order assignment
- Input and Output Range, Accuracy
 - 4.5V to 16V input & 0.2V to 2.7V output
 - 0.5% accurate output with differential sense
- Telemetry
 - 1.5% Input & Output voltage accuracy
 - 1.5% Output current accuracy
 - +/-2°C Temperature accuracy
- Improved Performance
 - Improved efficiency: Programmable Auto phase add/drop thresholds for optimization
 - Programmable Over-shoot & Under-shoot Reduction thresholds for better transient
 - Thermal Balance Management
- Protection Capability
 - Programmable Fault Response: Latch & Hiccup
 - UVLO, UVP, OVP, OCP, OTP
 - Cycle by cycle per-phase current limit
- Output BOM, Platform Area and Cost Reduction
 - Up to 4MHz switching frequency & Constant On Time control with fast transient for smaller & low-cost external passives
 - Programmable DC load line helps reduce the overshoot and the external capacitors
- Ease-of-use, Interfaces and Debug Features
 - Internal compensation
 - PMBus™ v1.4.1 Compliant/AVSBus 1.4/2.0 Compliant
 - Built in Multiple time Programmability (MTP) with up to 31 writes for field programmability
 - Black box registers for fault record
- RoHS Compliant and Green
- 8 mm × 8 mm, 68-Pin, QFN Package

Applications

- Server and Telecom Voltage Regulators
- Graphic Card Core Regulators
- Power Module

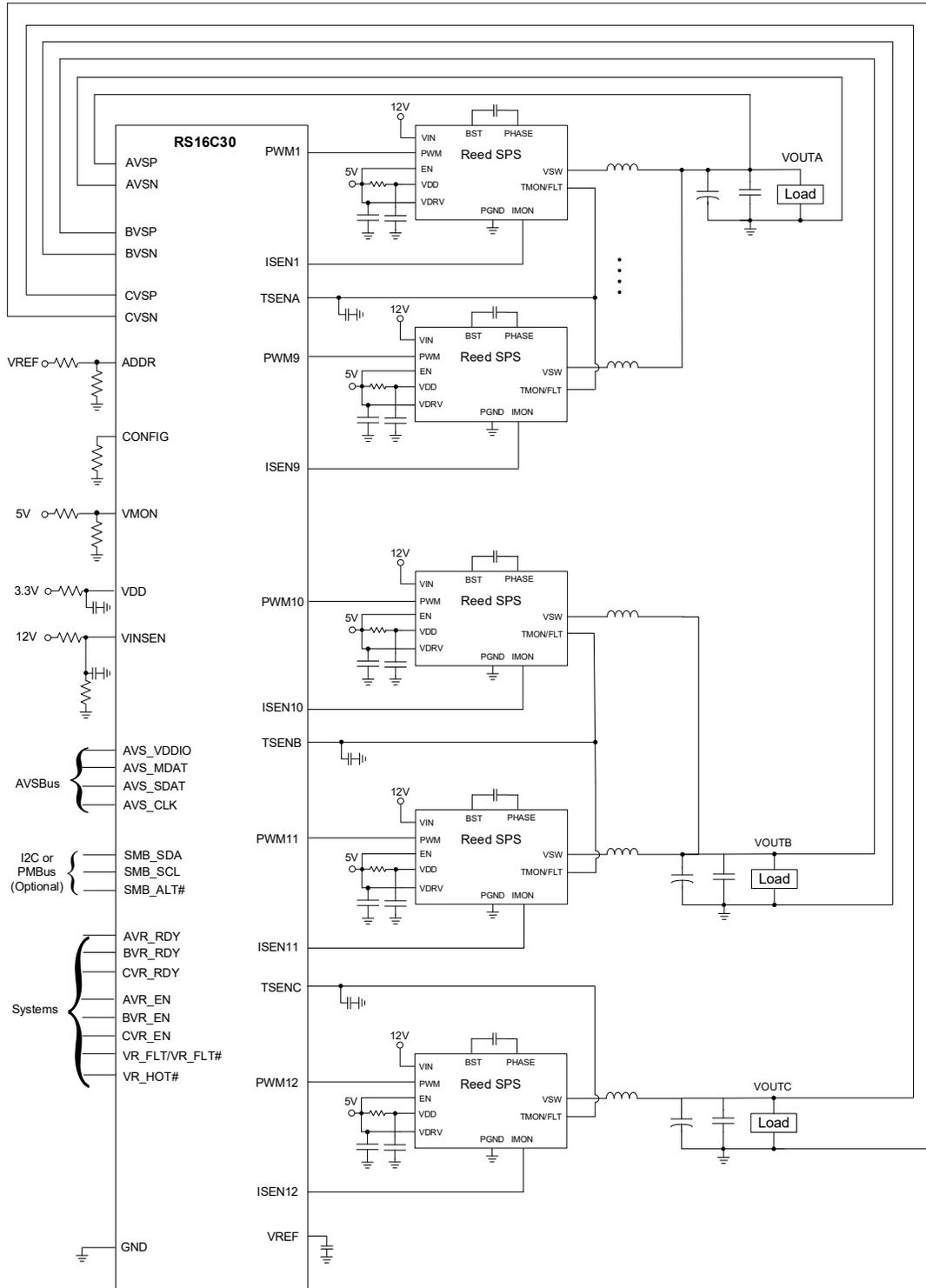
Description

RS16C30 is a AVSBus compliant triple output multiphase buck controller with built-in MTP & PMBus™ interface. It is fully compatible with Reed Semiconductor's smart power stage. Advanced control features such as programmable DC load line, undershoot & overshoot reduction provide fast transient response hence needing low output capacitance. The device also provides auto phase add/drop with phase current balancing for efficiency improvement across loads. It supports fast dynamic voltage transitions with programmable slew rates. All programmable parameters can be configured by the PMBus interface and can be stored in devices as default values. The MTP gives an added advantage of optimizing the device performance in the field.

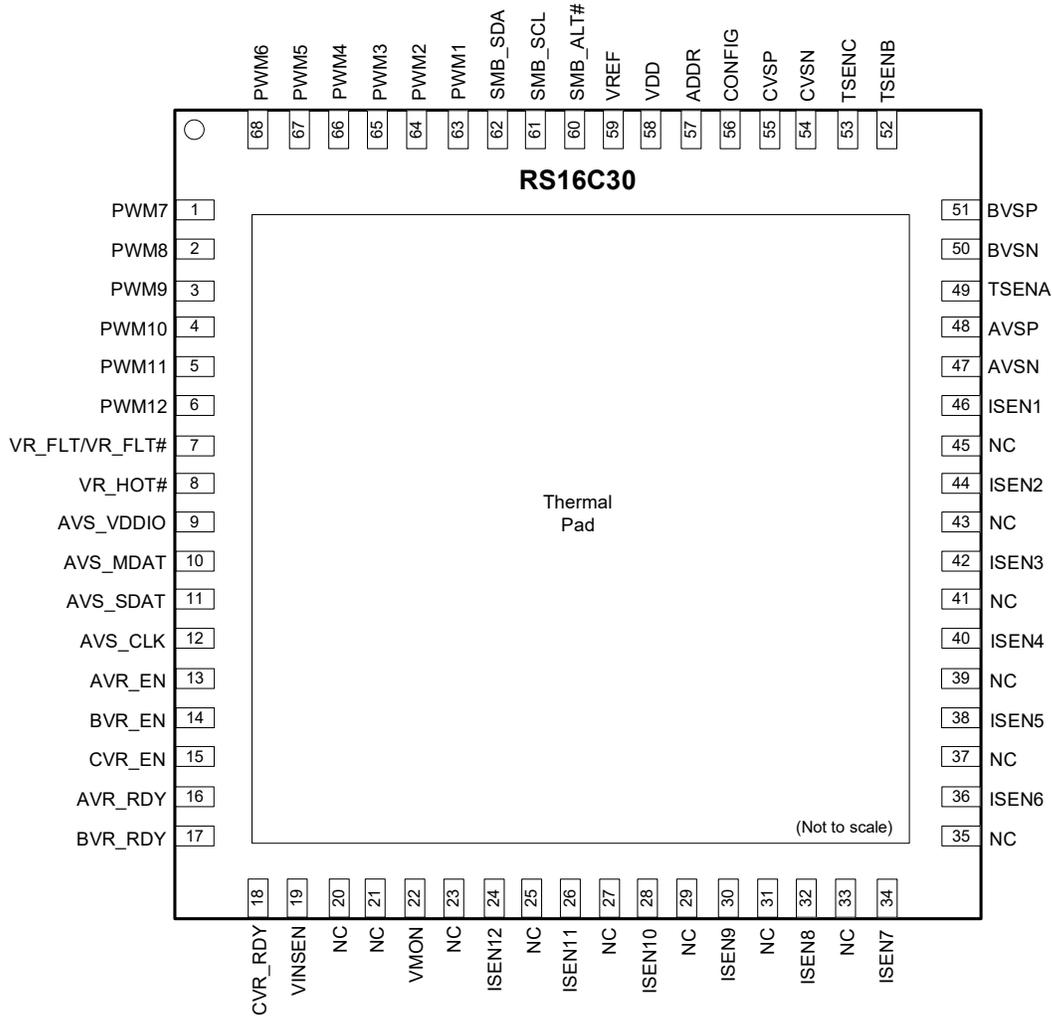
RS16C30 is offered in a 68-pin QFN package and is rated to operate from -40°C to 125°C

Typical Application Circuit

Application Example (9+2+1)



Pin Description List



PIN		I/O	Type	DESCRIPTION	
No.	NAME				
1	PWM7	O	3.3V CMOS	PWM signal for Phase 7	Tri-state logic level: 0V: Low Side FET ON 3.3V: High Side FET ON Tri-state (tied to VREF): Both FETs OFF If unused, leave them floating
2	PWM8			PWM signal for Phase 8	
3	PWM9			PWM signal for Phase 9	
4	PWM10			PWM signal for Phase 10	
5	PWM11			PWM signal for Phase 11	
6	PWM12			PWM signal for Phase 12	
7	VR_FLT/VR_FLT#	O	CMOS/ Open Drain	Active high catastrophic fault pin indicator, controller stops regulating when this pin is pulled high. To have an option to select active low, open-drain output or active high, CMOS output	
8	VR_HOT#	O	Open Drain	Active low smart power stage temperature indicator. VRHOT# is asserted at the temperature configured by (51h)OT_WARN_LIMIT.	
9	AVS_VDDIO	I	CMOS	VDDIO (1.2V or , 1.8V or 3.3V) powers and serves as the reference the AVSBus interface pins: AVS_CLK, AVS_MDAT and AVS_SDAT.	
10	AVS_MDAT	I	CMOS	AVSBus master data input.	
11	AVS_SDAT	I/O	CMOS	AVSBus slave data output.	
12	AVS_CLK	I	CMOS	AVSBus clock input.	
13	AVR_EN	I	CMOS	This pin used as Active High Enable for the Rail A.	
14	BVR_EN	I	CMOS	This pin used as Active High Enable for the Rail B.	
15	CVR_EN	I	CMOS	This pin used as Active High Enable for the Rail C.	
16	AVR_RDY	O	Open Drain	Active high, Power Good output asserts when the output voltage of Rail A is in regulation.	
17	BVR_RDY	O	Open Drain	Active high, Power Good output asserts when the output voltage of Rail B is in regulation.	
18	CVR_RDY	O	Open Drain	Active high, Power Good output asserts when the output voltage of Rail C is in regulation.	
19	VINSEN	I	Analog	To sense input voltage of power stages with a resistive voltage divider (1/6), needs a decoupling cap of 0.1uF to GND	
20	NC			No connection internally	
21	NC			No connection internally	
22	VMON	I	Analog	To sense driver voltage of power stages with a resistive voltage divider (1/5), needs a decoupling cap of 10nF to GND	
23	NC			No connection internally	If unused, leave them floating
24	ISEN12	I	Analog	Current Sense of Phase 12	
25	NC			No connection internally	

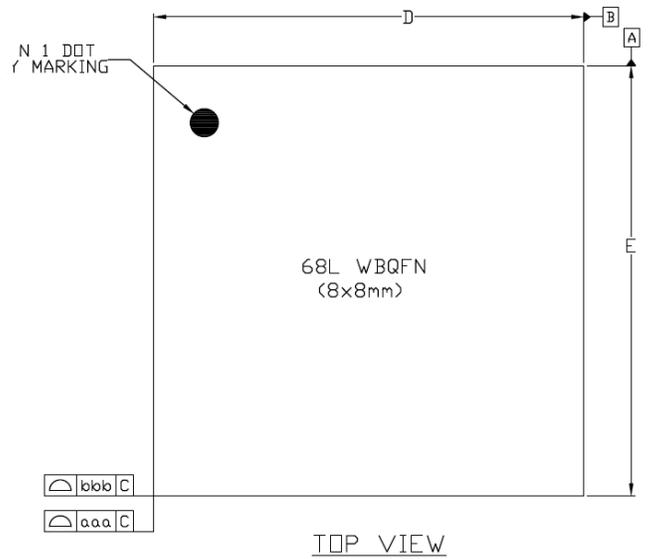
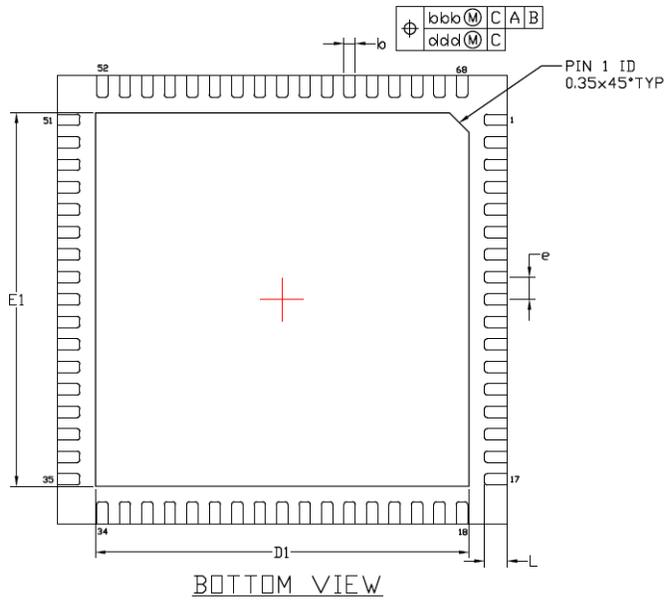
26	ISEN11	I	Analog	Current Sense of Phase 11
27	NC			No connection internally
28	ISEN10	I	Analog	Current Sense of Phase 10
29	NC			No connection internally
30	ISEN9	I	Analog	Current Sense of Phase 9
31	NC			No connection internally
32	ISEN8	I	Analog	Current Sense of Phase 8
33	NC			No connection internally
34	ISEN7	I	Analog	Current Sense of Phase 7
35	NC			No connection internally
36	ISEN6	I	Analog	Current Sense of Phase 6
37	NC			No connection internally
38	ISEN5	I	Analog	Current Sense of Phase 5
39	NC			No connection internally
40	ISEN4	I	Analog	Current Sense of Phase 4
41	NC			No connection internally
42	ISEN3	I	Analog	Current Sense of Phase 3
43	NC			No connection internally
44	ISEN2	I	Analog	Current Sense of Phase 2
45	NC			No connection internally
46	ISEN1	I	Analog	Current Sense of Phase 1
47	AVSN	I	Analog	Rail A GND remote voltage sense at the load point
48	AVSP	I	Analog	Rail A output remote voltage sense at the load point
49	TSENA	I	Analog	Temperature Sense input from all the phases of Rail A
50	BVSN	I	Analog	Rail B GND remote voltage sense at the load point
51	BVSP	I	Analog	Rail B output remote voltage sense at the load point
52	TSENB	I	Analog	Temperature Sense input from all the phases of Rail B
53	TSENC	I	Analog	Temperature Sense input from all the phases of Rail C
54	CVSN	I	Analog	Rail C GND remote voltage sense at the load point
55	CVSP	I	Analog	Rail C output remote voltage sense at the load point
56	CONFIG	I	Analog	MTP configuration selection pin. Tie a resistor to GND to this pin
57	ADDR	I	Analog	An external resistor from ADDR to GND and another from VREF to ADDR sets the PMBus address. The address is latched at VDD power up.
58	VDD	I	Power	3.3V supply voltage input. Needs a decoupling cap of $\geq 1\mu\text{F}$ to GND
59	VREF	O	Power	1.5V reference voltage output. Needs a decoupling cap of $1\mu\text{F}$ to GND, but not greater than $4.7\mu\text{F}$

60	SMB_ALT#	O	Open Drain	PMBus active low ALERT# signal.
61	SMB_SCL	I	Open Drain	PMBus serial clock signal.
62	SMB_SDA	I/O	Open Drain	PMBus bi-directional serial data signal.
63	PWM1	O	3.3V CMOS	PWM signal for Phase 1
64	PWM2			PWM signal for Phase 2
65	PWM3			PWM signal for Phase 3
66	PWM4			PWM signal for Phase 4
67	PWM5			PWM signal for Phase 5
68	PWM6			PWM signal for Phase 6
*	Thermal Pad	I	Ground	Ground pad, tie to GND plane with vias.

Ordering Information

Part Number	Package	Shipping Method	Package Marking
RS16C30R	QFN-68	3ku Tape & Reel	R16C30

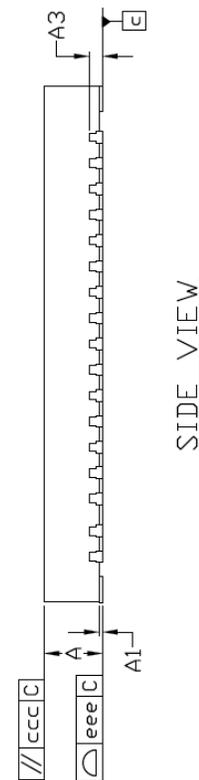
Package information



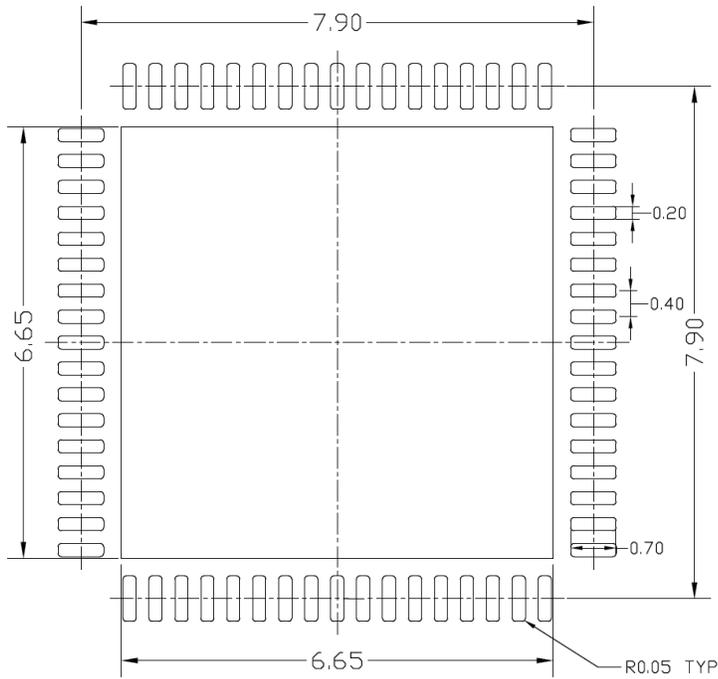
Notes

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER JEDEC MO-220.
3. DRAWING IS NOT TO SCALE.

Dimensional Ref.			
REF.	Min.	Nom.	Max.
A	0.80	0.85	0.90
A1	---	---	0.05
A3	0.203 Ref.		
D	7.90	8.00	8.10
E	7.90	8.00	8.10
D1	6.60	6.65	6.70
E1	6.60	6.65	6.70
b	0.20	0.20	0.25
e	0.40BSC		
L	0.35	0.40	0.45
Tol. of Form&Position			
aaa	0.10		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		



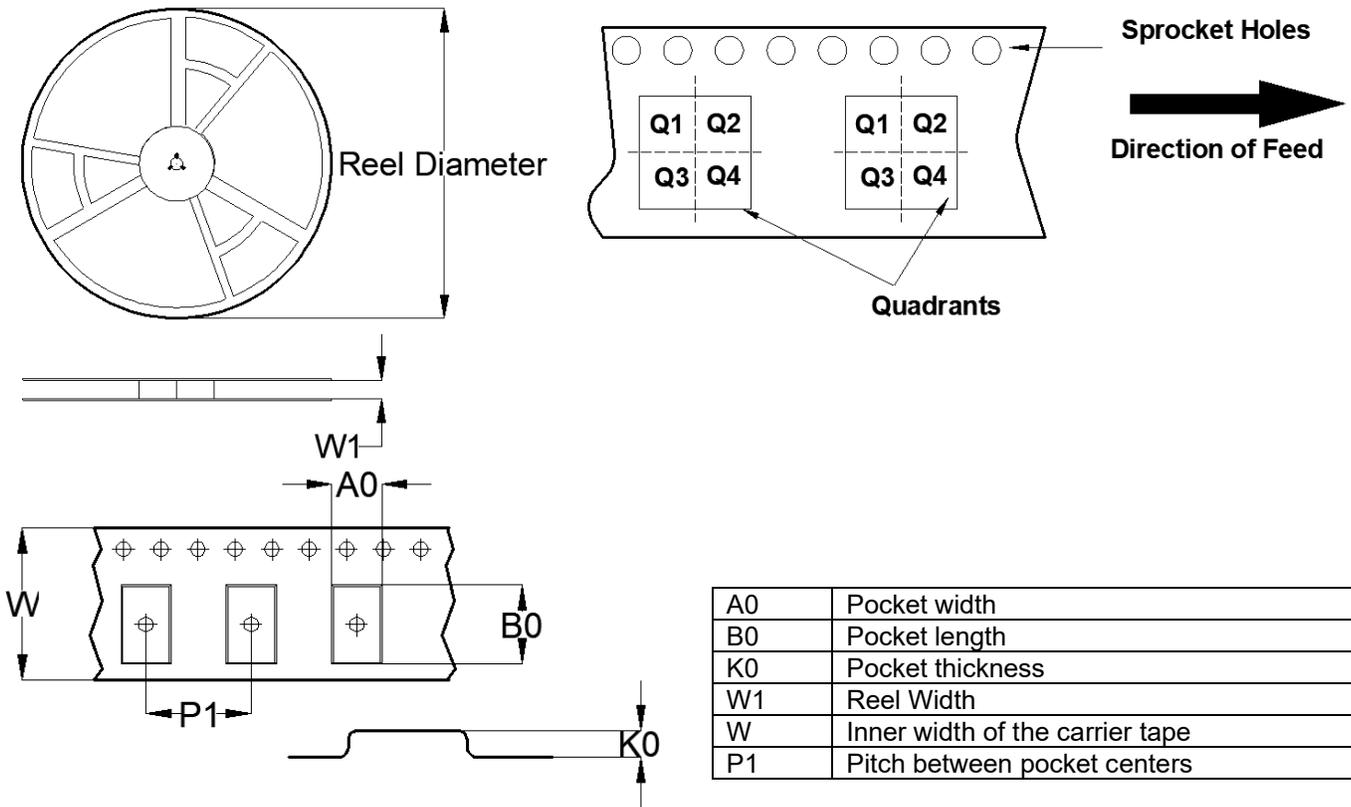
Recommended Land Pattern



NOTE:

- 1) ALL DIMENSIONS ARE IN MILLIMETERS.
- 2) LEAD COPLANARITY SHALL BE 0.08 MILLIMETERS MAX.
- 3) JEDEC REFERENCE IS MO-220.
- 4) DRAWING IS NOT TO SCALE.

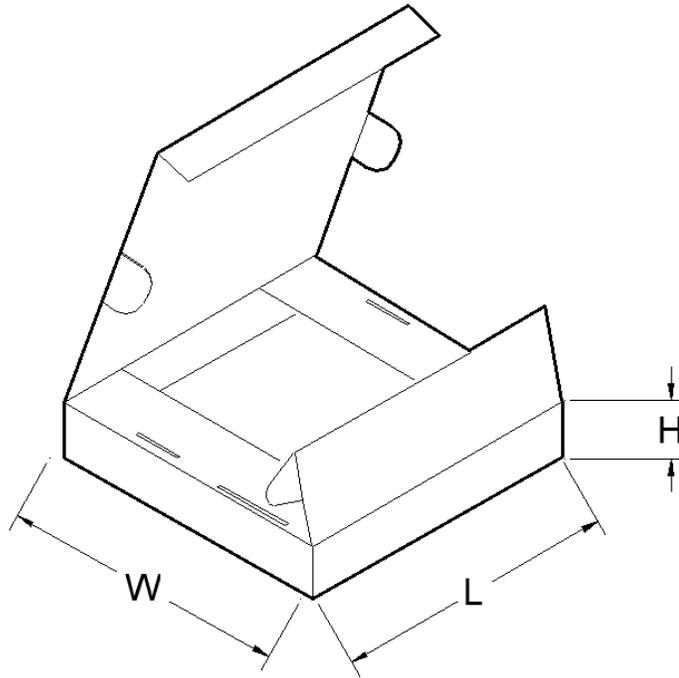
Tape and Reel Information



PKG type(mm)	Reel Diameter(mm)	Reel Width W1(mm)	A0(mm)	B0(mm)	K0(mm)	P1(mm)	W(mm)	Quad
8x8	330	16	8.3	8.3	1.1	12	16	Q2

*All the data is nominal

Pizza Box Dimension



PKG type(mm)	Units/box	Length(mm)	Width(mm)	Height(mm)
8x8	3000	354	337	55

*All the data is nominal