RS18G20 — 16-Phase Dual-Rail TLVR Controller with SVID and PMBus

Features

Flexible 16-Phase Dual-Rail Architecture

- Up to 16 phases with flexible N + M ≤ 16 allocation
  - Configurations from 16 + 0 to 8 + 8
- Flexible phase-order assignment

Native TLVR & Fast Transient Performance

- Native Trans-Inductor Voltage Regulator (TLVR) support
  - No additional external passive components required
  - Integrated 1kΩ current-sense resistor
- Programmable overshoot and undershoot reduction
- Automatic phase add/drop with programmable thresholds
- Thermal phase balancing
- Up to 4MHz switching frequency
- Constant-on-time control
- Programmable DC load line

Wide operating range and high-accuracy regulation

- 4.5V to 16V input; 0.2V to 2.8V output
- ±0.5% output-voltage accuracy with differential sensing
- Programmable load-line control

Integrated telemetry

- ±1.5% voltage and current accuracy
- ±2°C temperature accuracy

Comprehensive protection

- UVLO, UVP, OVP, OCP, and OTP
- Cycle-by-cycle per-phase current limiting
- Programmable latch-off or auto-retry fault response

SVID, PMBus, Configuration & Diagnostics

- Intel VR14 / VR13.HC / VR13 compliant
- PMBus 1.4.1 compliant
- Internal compensation
- Multi-Time Programmability (MTP) with up to 32 writes
- Black-box fault-record registers

Package

- 7mm × 7mm, 56-pin QFN
- RoHS compliant and green

Applications

- Server and Computing Core Power
- CPU and GPU Core Power
- AI Accelerators and High-Performance Computing
- Graphics Cards
- Telecom Power Systems

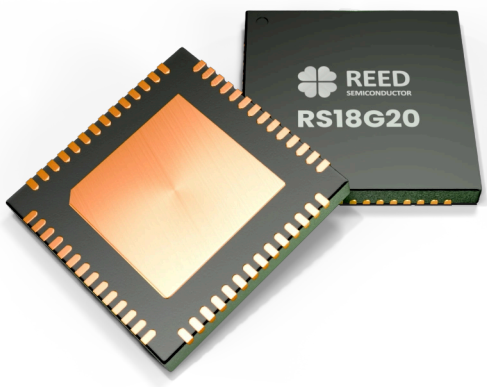
Description

The RS18G20 is a high-performance, dual-output digital multiphase controller supporting up to 16 phases with flexible N + M ≤ 16 phase allocation. Designed for server, computing, graphics, and telecom power applications, the device supports a 4.5V to 16V input range and 0.2V to 2.8V output range with ±0.5% output voltage accuracy.

Native TLVR support, Constant-On-Time (COT) control, programmable DC load line, automatic phase add/drop, and operation up to 4MHz enable fast transient response and efficient high-current power conversion. Integrated telemetry provides accurate monitoring of input and output voltage, output current, and temperature.

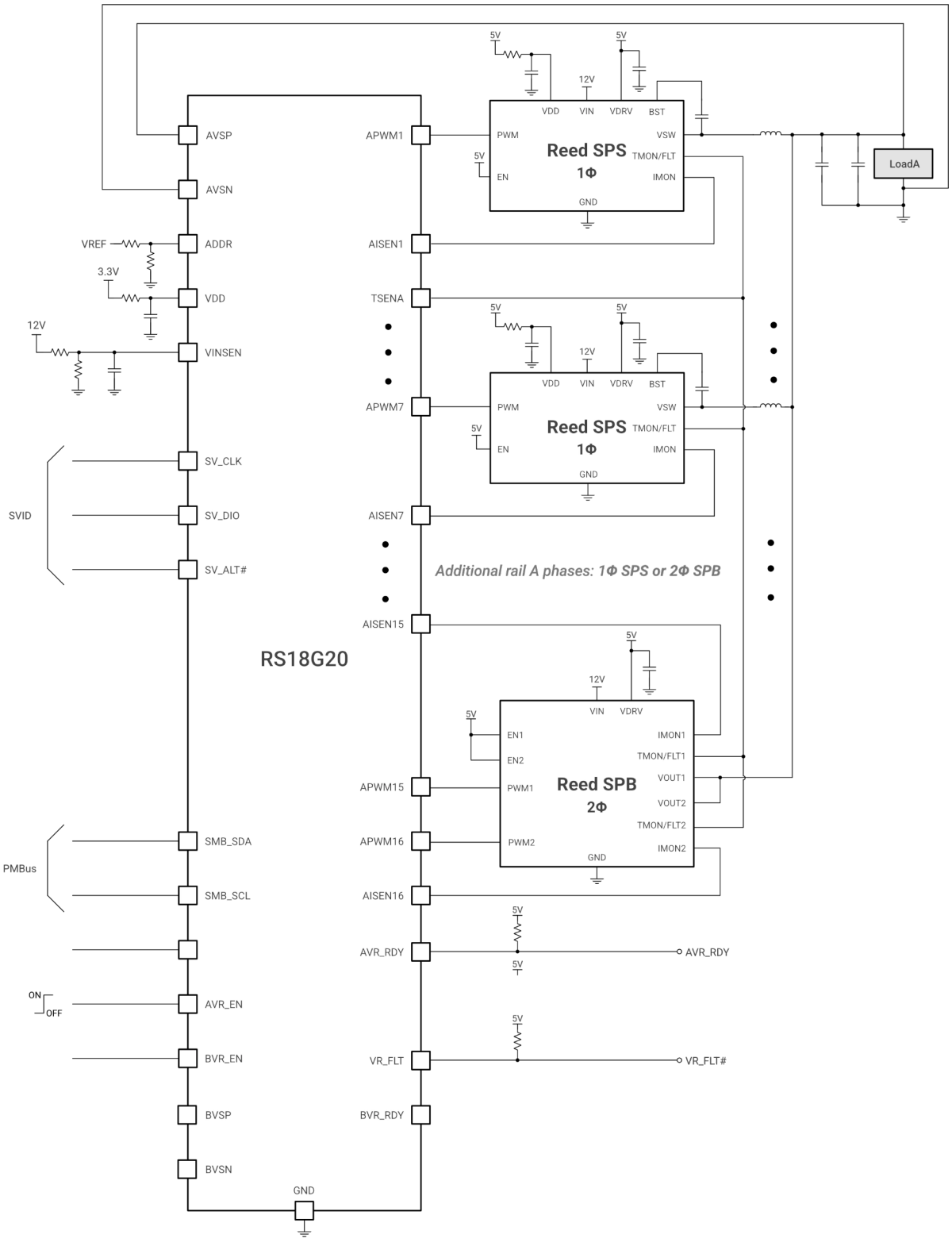
The RS18G20 supports Intel VR14 / VR13.HC / VR13 SVID and PMBus 1.4.1 for digital configuration, telemetry, and system monitoring. MTP enables nonvolatile configuration, while black-box registers capture fault information for system diagnostics. Comprehensive protection includes UVLO, UVP, OVP, OCP, OTP, and cycle-by-cycle per-phase current limiting.

Designed to operate with Reed Smart Power Stages or Smart Power Blocks, the RS18G20 provides a scalable power solution for high-current processor rails. The device is available in a 7mm × 7mm, 56-pin QFN package and operates from −40°C to 125°C.



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Typical Application Schematic (16 + 0)



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Ordering Information

PART NUMBER	PACKAGE	SIZE	MSL RATING	SHIPPING METHOD	PACKAGE MARKING
RS18G20R	QFN-56	7 × 7mm	Level-3	3000u Tape & Reel	R18G20

Top Marking



Line 1

- RS: Prefix of Reed Semiconductor (R is replaced by E for engineering lots)
- YY: Year code
- WW: Week code

Line 2

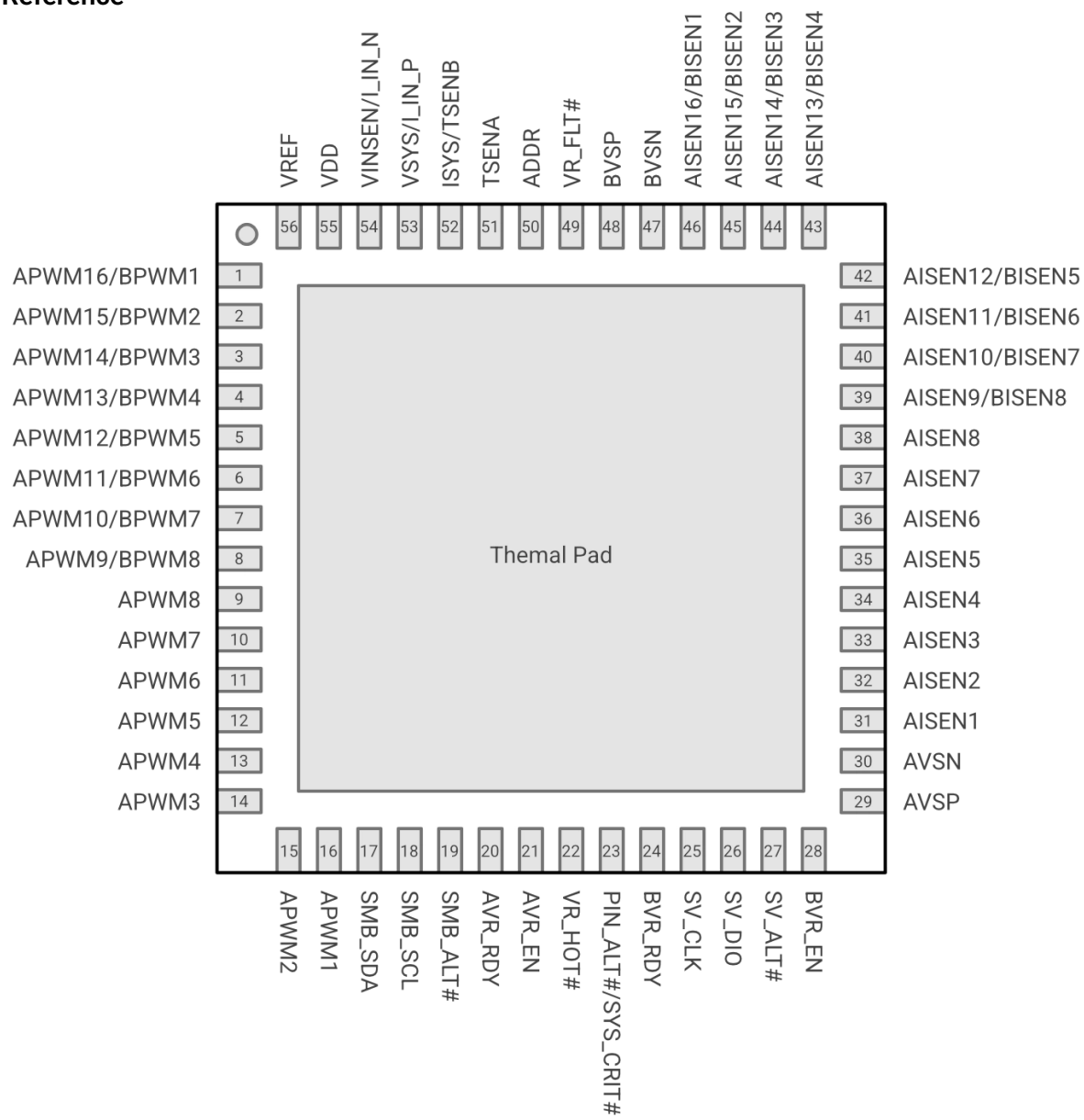
- PPPPP: Truncated part number

Line 3

- LLLLL: Lot code
- S: Assembly site code

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Package Reference



QFN-56 (7 × 7mm)

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Pin Descriptions

PIN	NAME	TYPE	DESCRIPTION
1	APWM16/ BPWM1	O	PWM output for Rail A Phase 16 or Rail B Phase 1.
2	APWM15/ BPWM2	O	PWM output for Rail A Phase 15 or Rail B Phase 2.
3	APWM14/ BPWM3	O	PWM output for Rail A Phase 14 or Rail B Phase 3.
4	APWM13/ BPWM4	O	PWM output for Rail A Phase 13 or Rail B Phase 4.
5	APWM12/ BPWM5	O	PWM output for Rail A Phase 12 or Rail B Phase 5.
6	APWM11/ BPWM6	O	PWM output for Rail A Phase 11 or Rail B Phase 6.
7	APWM10/ BPWM7	O	PWM output for Rail A Phase 10 or Rail B Phase 7.
8	APWM9/ BPWM8	O	PWM output for Rail A Phase 9 or Rail B Phase 8.
9	APWM8	O	PWM output for Rail A Phase 8.
10	APWM7	O	PWM output for Rail A Phase 7.
11	APWM6	O	PWM output for Rail A Phase 6.
12	APWM5	O	PWM output for Rail A Phase 5.
13	APWM4	O	PWM output for Rail A Phase 4.
14	APWM3	O	PWM output for Rail A Phase 3.
15	APWM2	O	PWM output for Rail A Phase 2.
16	APWM1	O	PWM output for Rail A Phase 1.
17	SMB_SDA	I/O	Open-drain PMBus bidirectional serial data.
18	SMB_SCL	I	PMBus serial clock input.
19	SMB_ALT#	O	Active-low, open-drainPMBus Alert
19	VR_FLT#	O	Active-low, open-drain catastrophic-fault output.
20	AVR_RDY	O	Active-high, open-drain Power Good output for Rail A.
21	AVR_EN	I	Active-high Rail A enable input.
22	VR_HOT#	O	Active-low, open-drain temperature warning output. Asserts when the programmed temperature threshold is reached.
23	PIN_ALT#/ PSYS_CRIT#	O	Configurable active-low, open-drain power warning output. Programmable as either PIN_ALT# or PSYS_CRIT# based on the selected SVID protocol and platform requirements.
24	BVR_RDY	O	Active-high, open-drain Power Good output for Rail B. Asserts when the output voltage is in regulation.
25	SV_CLK	I	SVID serial clock input. Pull up to an external 1.0V supply through a resistor.

PWM outputs (Pins 1–16): 3.3V CMOS tri-state outputs. Low: low-side FET ON; High: high-side FET ON; Tri-state: both FETs OFF. If unused, leave floating.

Type: I = Input, O = Output, I/O = Bidirectional, P = Power, G = Ground, — = No Connect.

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Pin Descriptions

PIN	NAME	TYPE	DESCRIPTION
26	SV_DIO	I/O	SVID bidirectional serial data. Pull up to an external 1.0V supply through a resistor.
27	SV_ALT#	O	Active-low, open-drain SVID ALERT# output. Asserts when the VR status changes. Pull up to an external 1.0V supply through a resistor.
28	BVR_EN	I	Active-high Rail B enable input.
29	AVSP	I	Rail A positive remote-sense input. Connect to the output-voltage sense point at the load.
30	AVSN	I	Rail A negative remote-sense input. Connect to load ground.
31	AISEN1	I	Rail A Phase 1 current-sense input.
32	AISEN2	I	Rail A Phase 2 current-sense input.
33	AISEN3	I	Rail A Phase 3 current-sense input.
34	AISEN4	I	Rail A Phase 4 current-sense input.
35	AISEN5	I	Rail A Phase 5 current-sense input.
36	AISEN6	I	Rail A Phase 6 current-sense input.
37	AISEN7	I	Rail A Phase 7 current-sense input.
38	AISEN8	I	Rail A Phase 8 current-sense input.
39	AISEN9/ BISEN8	I	Current-sense input for Rail A Phase 9 or Rail B Phase 8.
40	AISEN10/ BISEN7	I	Current-sense input for Rail A Phase 10 or Rail B Phase 7.
41	AISEN11/ BISEN6	I	Current-sense input for Rail A Phase 11 or Rail B Phase 6.
42	AISEN12/ BISEN5	I	Current-sense input for Rail A Phase 12 or Rail B Phase 5.
43	AISEN13/ BISEN4	I	Current-sense input for Rail A Phase 13 or Rail B Phase 4.
44	AISEN14/ BISEN3	I	Current-sense input for Rail A Phase 14 or Rail B Phase 3.
45	AISEN15/ BISEN2	I	Current-sense input for Rail A Phase 15 or Rail B Phase 2.
46	AISEN16/ BISEN1	I	Current-sense input for Rail A Phase 16 or Rail B Phase 1.
47	BVSN	I	Rail B negative remote-sense input. Connect to load ground.
48	BVSP	I	Rail B positive remote-sense input. Connect to the output-voltage sense point at the load.
49	VR_FLT#	O	Open drain, active low catastrophic fault indicator
50	ADDR	I	PMBus address-select input.

Type: I = Input, O = Output, I/O = Bidirectional, P = Power, G = Ground, — = No Connect.

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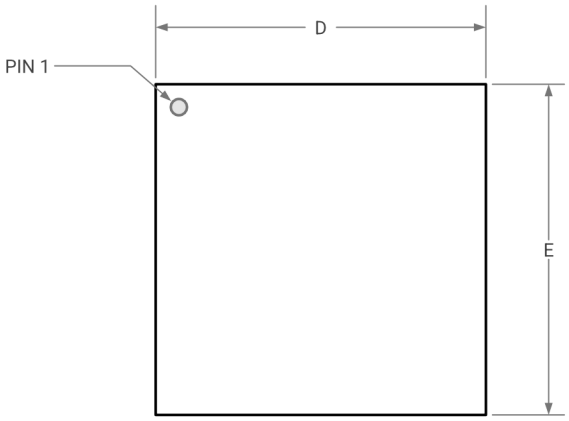
Pin Descriptions

PIN	NAME	TYPE	DESCRIPTION
51	TSENA	I	Temperature-sense input for Rails A
52	ISYS/TSENB	I	Configurable analog input for Rail B temperature sensing or system input-current sensing.
53	VSYS/I_IN_P	I	Configurable analog input for system-voltage sensing or the positive side of a local input-current sense resistor.
54	VINSEN/ I_IN_N	I	Configurable analog input for power-stage input-voltage sensing or the negative side of a local input-current sense resistor.
55	VDD	P	3.3V supply input. Connect a ≥1μF decoupling capacitor to GND.
56	VREF	O	1.5V reference output. Connect a 1μF decoupling capacitor to GND.
—	Themal Pad	G	Exposed thermal pad. Connect to the GND plane with multiple thermal vias.

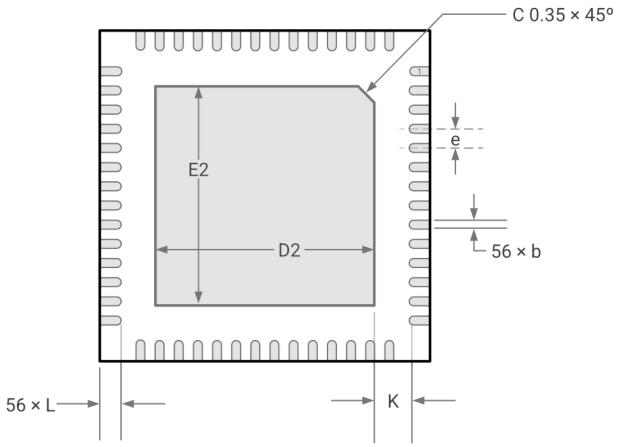
Type: I = Input, O = Output, I/O = Bidirectional, P = Power, G = Ground, — = No Connect.

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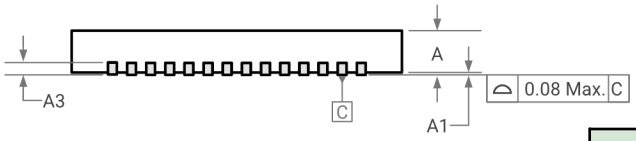
Package Dimensions



TOP VIEW



BOTTOM VIEW



SIDE VIEW

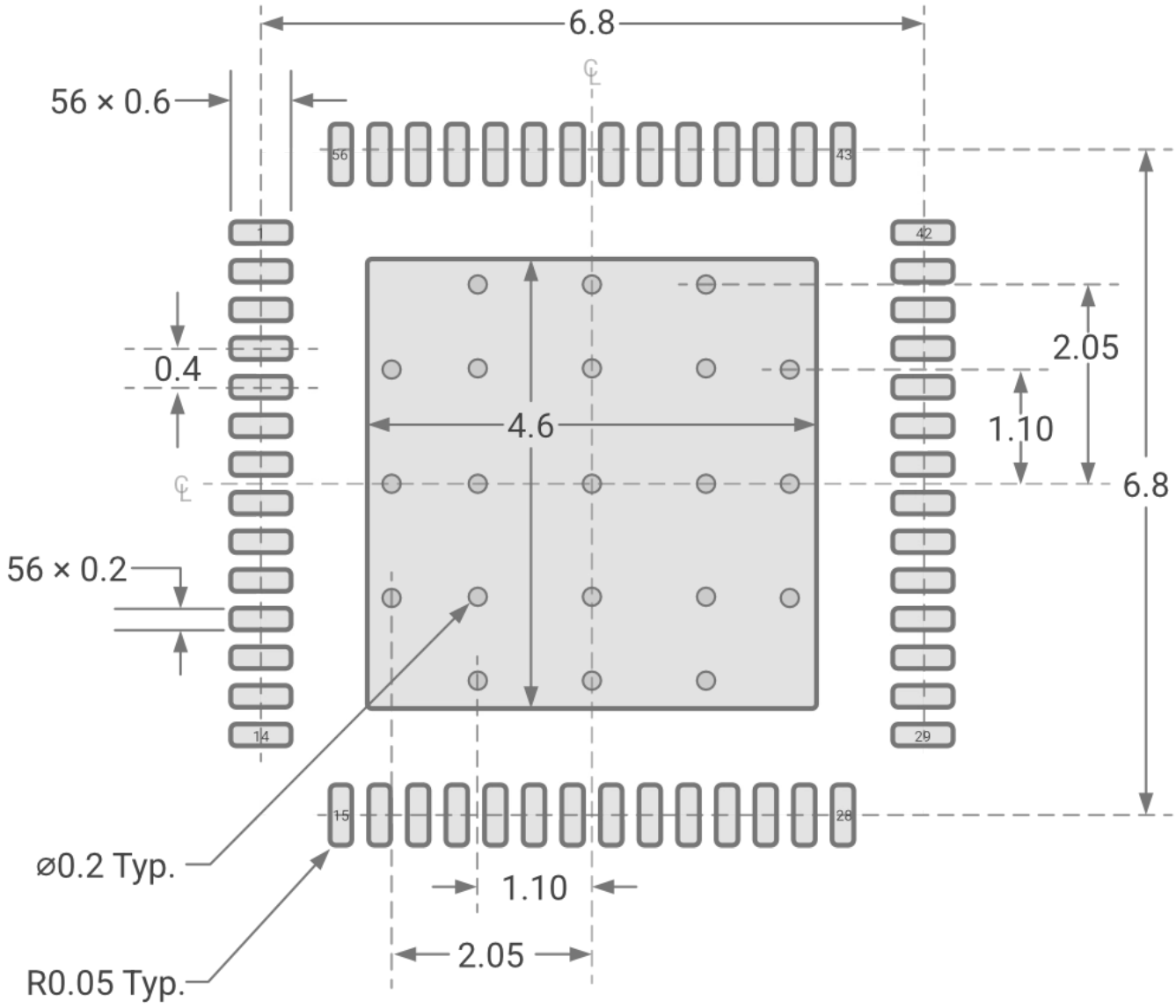
REF	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	—	0.05
A3		0.203 Ref.	
D	6.90	7.00	7.10
E	6.90	7.00	7.10
D2	4.55	4.60	4.65
E2	4.55	4.60	4.65
b	0.15	0.20	0.25
e		0.40 BSC	
L	0.35	0.40	0.45
K	0.20	—	—

Notes

1. All dimensions are in millimeters.
2. Drawing per JEDEC MO-220.
3. Drawing is not to scale.

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Recommended Land Pattern

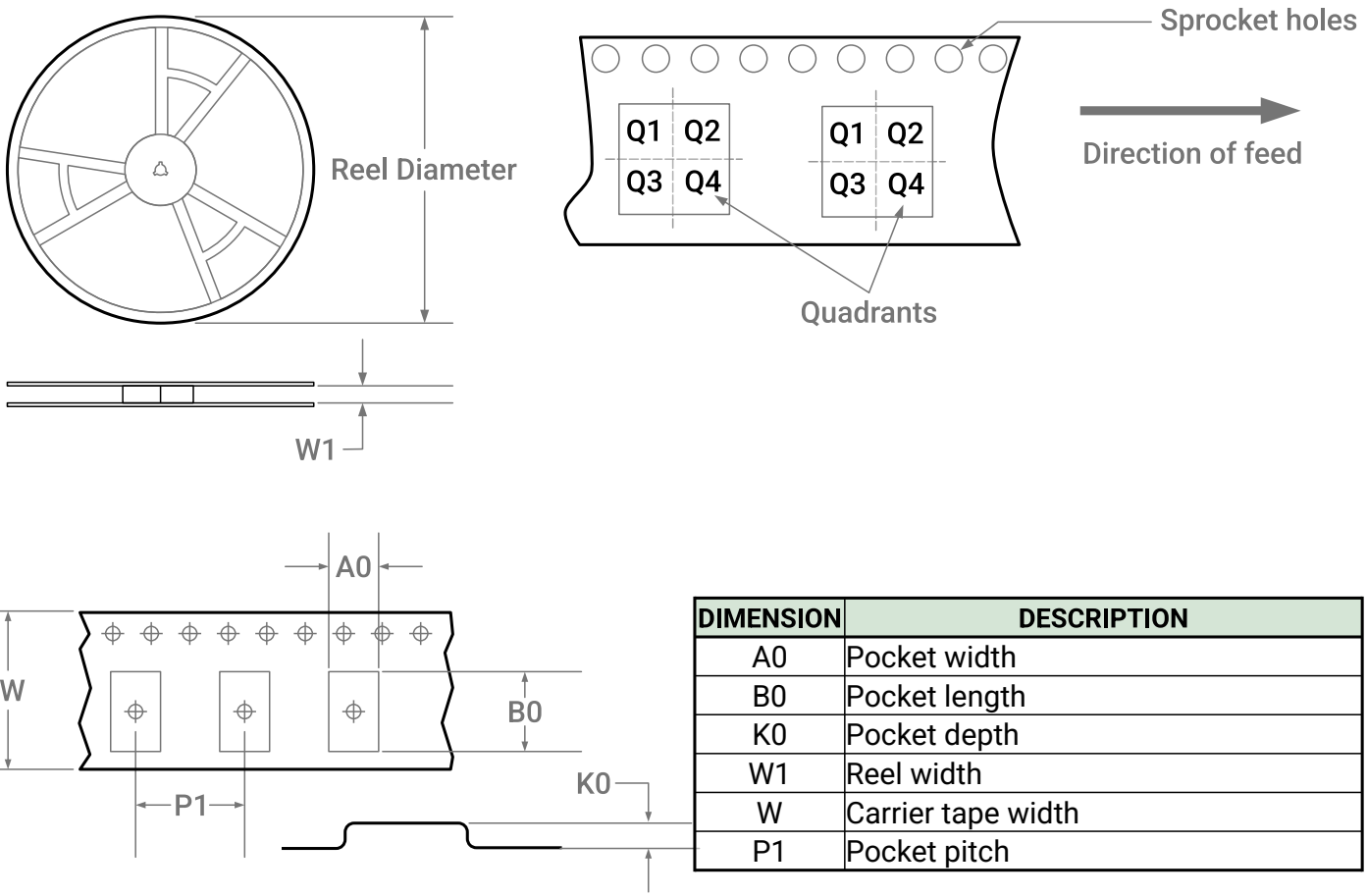


Notes:

1. All dimensions are in millimeters.
2. Drawing is not to scale.

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Tape and Reel Information



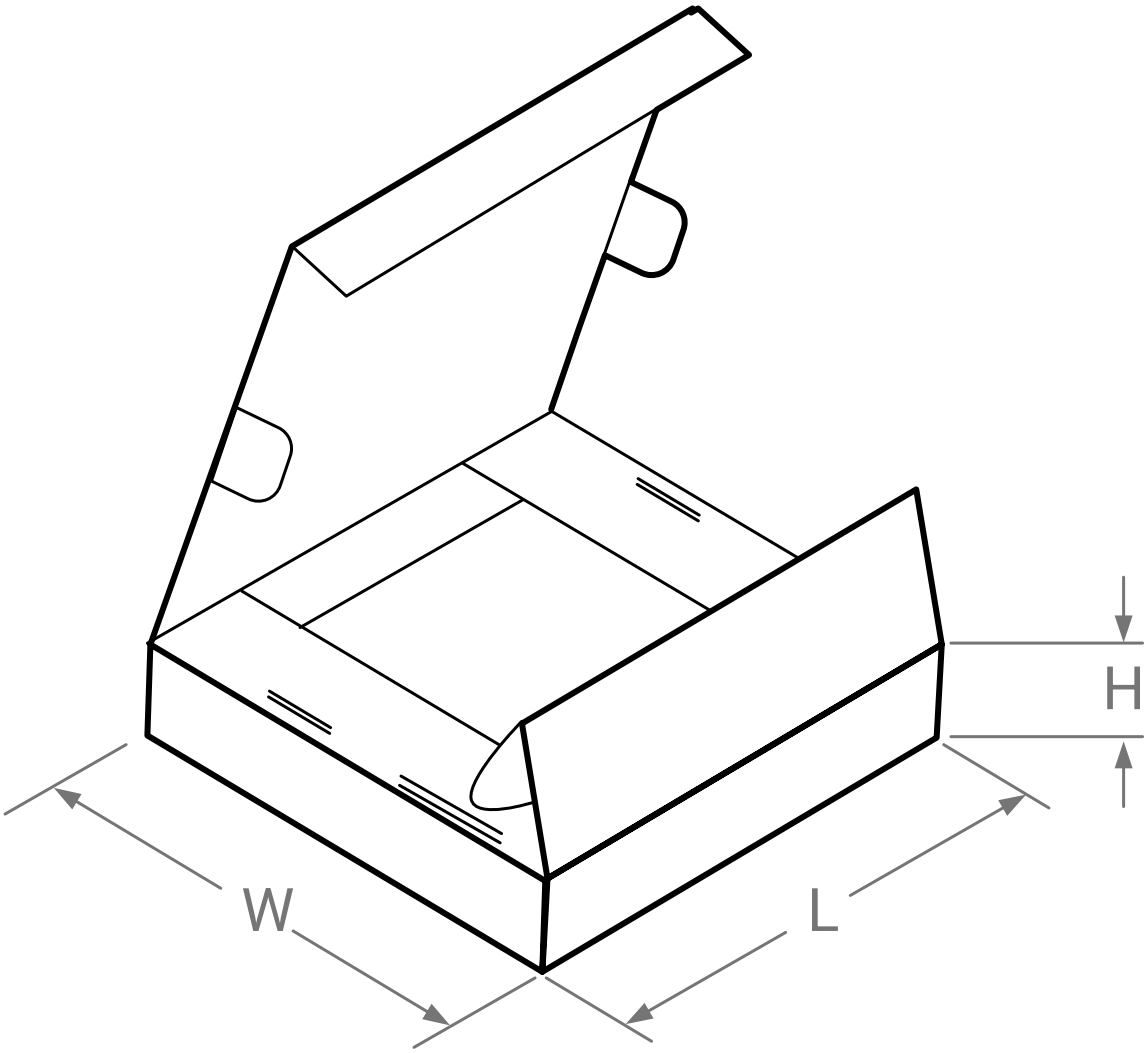
DIMENSION	DESCRIPTION
A0	Pocket width
B0	Pocket length
K0	Pocket depth
W1	Reel width
W	Carrier tape width
P1	Pocket pitch

PACKAGE SIZE	REEL DIAMETER	W1	A0	B0	K0	P1	W	QUADRANT
7 × 7	330	16.8	7.25	7.25	1.0	12	16	Q2

Note:
1. All dimensions are nominal
2. All dimensions are in millimeters (mm)

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Pizza Box Dimensions



PACKAGE SIZE	UNITS / BOX	LENGTH	WIDTH	HEIGHT
7 × 7	3000	367	367	38

Notes:

1. All measurements are in millimeters;
2. All measurements are nominal.

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