



3166 **BLUETOOTH**[®] RUGGED **RAIN**[®] RFID UHF READER

**EXTRA-TOUGH, HIGH PERFORMANCE, LONG RANGE UHF RFID
READING WITH EPOP-LOQ[®] CONNECTIVITY AND CHARGING**



Latest Hardware Advances

The new 3166 RAIN[®] RFID UHF Reader boasts TSL's latest hardware innovations and performance improvements, in a more efficient reader with an all-day battery life.

Using the latest generation of Impinj silicon, read rates have been boosted up to 1200 tags per second. Multiple tag operations per tag are possible during an inventory scan - read multiple areas of each tag, or write to or even lock the tag. On reader de-duplication prevents overwhelming the connected host with information.

Support has been added for passive sensor transponders (temperature, strain, humidity, acceleration) from HID and others – contact TSL for information regarding how to utilise these sensor transponders.

Designed to read and write to EPC Class 1 Gen 2 and EPC Class 1 Gen 2V2 tags, the 3166 can also be configured with class leading high performance 2D data scanning to bring unparalleled data collection capabilities to any host it is connected to.

Single Point Charge Solution

The 3166 Docking Station allows charging of both the 3166 RAIN[®] RFID UHF Reader and a smartphone or handheld terminal attached via an ePop-Loq[®] mount. The unique design can accommodate a wide range of devices from many handheld and smartphone manufacturers. The 3166 Reader boasts a faster ePop-Loq mode than previous TSL readers to accommodate higher tag throughput.

Tough Impact Resistant Housing

The 3166 Reader from TSL provides high performance UHF RFID reading and writing in an incredibly tough and rugged form factor. The reader

is highly resistant to water, dust and mechanical trauma. A high capacity battery provides non-stop operation of the reader over the full working day.

Platform Independence

Use existing *Bluetooth*[®] wireless technology enabled¹ host devices including Enterprise Handhelds, Consumer Phones, Tablets and PC's – the 3166 will bring high performance RFID and 2D scanning to all these devices running a wide range of Operating Systems.

In addition to Bluetooth Classic, Bluetooth Low-Energy provides a modern, secure link to even more devices.

Extensive software support is available for a wide range of platforms including code samples, demonstration applications and source code.

Batch Mode

Transponder EPC readings can optionally be recorded on the embedded storage, meaning that the 3166 RAIN[®] RFID UHF Reader can be used independently of a host device. The 3166 can store up to 500 million* transponder EPCs - date and time stamped by the on-board Real Time Clock.

Backwards compatible

The 3166 Rugged *Bluetooth*[®] RAIN[®] RFID UHF Reader is designed to work with existing apps built with TSL SDKs, but with improved performance. TSL's latest ASCII protocol provides the developer with a powerful set of commands that carry out multiple actions locally within the reader. This approach enables multiple tag operations to be executed using simple pre-configured commands which speeds up integration of the reader into applications.

Features:

Faster tag read rate

Gathers RFID data at a blistering pace - up to 1200 tags per second

Longer Operating Times

Up to 34% increase in battery life compared to the previous generation 2166 Reader

Multiple RF Profiles

- high sensitivity
- maximum read rate
- dynamic switching between modes

ETSI Upper Band Option

Bulk encoding feature

Bluetooth[®] improvements

- Bluetooth Classic speed boost (iOS ~2x speed improvement)
- BLE (Bluetooth Low Energy) enabled - no need for MFI (Apple) app registration
- Independent battery status and device information service

Hardware and OS Independence

Operates with Android, iOS, Linux, Mac and Windows.

High Performance Barcode Scanning

An optional barcode engine can be specified to provide 1D and 2D barcode data capture



3166 SPECIFICATIONS

Physical and Environmental Characteristics

Dimensions:	178 x 105 x 172 mm (LxWxH).
Weight:	865 g / 30.5 oz (including battery).
User input:	Single stage trigger.
User feedback:	Speaker, vibration motor, LEDs.
Power:	Rechargeable Lithium Ion removeable battery pack (10.8V, 3.35Ah, 36.2Wh).
Minimum operating time ¹ :	Light use ² : 33.5 hrs Moderate use ³ : 21.5 hrs Heavy use ⁴ : 12 hrs ⁵
Input Rating:	15.0Vdc, 4.34A.
Enclosure materials:	Polycarbonate and TPU.

Performance Characteristics

RFID engine:	TSL [®] custom module with embedded Impinj E710.
Communication protocols:	TSL [®] ASCII 2.0 parameterised command set.
Memory:	Embedded 32GB* storage memory - store up to 500 million date and time stamped EPCs
Compatible Host devices (Bluetooth [®]):	Any Bluetooth [®] Host ⁶ supporting the Serial Port Profile (SPP) or Human Interface Device (HID) profile (Android, iOS, Linux, Mac, Windows). Comparison of Bluetooth[®] modes for TSL[®] UHF Readers.
Compatible Host devices (USB):	Any USB host with USB CDC support (Windows, Linux, Mac, Android).

Environmental

Operating Temp.:	-10°C to 55°C (14°F to 131°F).
Charging Temp.:	5°C to 40°C (41°F to 104°F).
Storage Temp.:	Less than 1 month at at -20 to +60°C (-4°F to 140°F). Less than 3 months at -20°C to +45°C (-4°F to 113°F). Less than 1 year at -20°C to +20°C (-4°F to 68°F).
Humidity:	5% to 85% non-condensing.
Drop Spec:	1.8m.
Tumble:	1500 0.5 metre tumbles at room temperature (3,000 cycles).
Environmental Sealing:	IP67.
Electrostatic Discharge (ESD):	± 15kVdc air discharge; ± 8kVdc contact discharge.
MIL-STD 810F:	Meets and exceeds applicable MIL-STD 810F for drop, tumble and sealing.

RFID Performance

Standards supported:	EPC Class 1 Gen2 and EPC Class 1 Gen2v2
Nominal read range ⁷ :	Up to 9 m (29.5 ft).
Nominal write range ⁷ :	Up to 4 m (13.1 ft).
Field:	110-degree forward facing (approx.) measured from front of device.
Antenna:	Circularly Polarised.

Frequency Range:	EU: 865-868MHz, 916-919MHz US: 902-928MHz
Maximum Output Power:	Up to 30 dBm (region dependent) + 4.0 dBiC Antenna.

Barcode Scanning

Optional 2D Barcode Engine:	Optional TSL [®] custom 2D Barcode Scan Engine module.		
Sensor Resolution:	1280 x 960 pixels, rolling shutter		
Field of View:	Horizontal: 44.5°, vertical: 33.5°		
Focal Distance:	From front of engine: 15.24 cm (6 in.)		
Aiming LED:	Green LED		
Illumination:	1 warm white LED		
Symbologies Supported:	1D: All major codes 2D: PDF417, MicroPDF417, Composite, RSS, TLC-39, Datamatrix, QR code, Micro QR code, Aztec, MaxiCode Postal Codes: US PostNet, US Planet, UK Postal, Australian Postal, Japan Postal, Dutch Postal (KIX).		
Ranges ⁸ :	Barcode	Near	Far
	5 mil Code 39	6.1 cm	24.1 cm
	5 mil Code 128	7.1 cm	22.9 cm
	6.67 mil PDF 417	6.1 cm	20.3 cm
	10 mil DataMatrix	7.4 cm	21.6 cm
	100% UPCA	4.6 cm	49.5 cm
	15 mil QR	3.0 cm	29.2 cm
	20 mil QR	3.0 cm	35.6 cm

Communication

Bluetooth [®] :	Bluetooth [®] v4.2 compliant (v5.1 compatible)
Bluetooth GATT Services:	<ul style="list-style-type: none"> Device Information Service Battery Service HID over GATT Serial over GATT (TSL)
Bluetooth Frequency Range:	2.4 - 2.4835 GHz.
Bluetooth Profiles:	SPP Profile, HID Profile, Apple iAP2, Bluetooth Low Energy.
Bluetooth Range ⁹ :	Up to 100m.
Bluetooth Pairing:	Simple Secure Pairing, NFC OOB Pairing.
Direct USB	Connection via ePop-Loq [®] cases (separate purchase).

¹ Minimum operating time figures are based on new units that have been stored, charged and operated within the stated Environmental Specifications. Units stored over 3 months must be recharged every 3 months. Number of transponders in the environment affects minimum operating time.

² Light Use: Continuous RFID inventories for 20s of every 120s

³ Moderate Use: Continuous RFID inventories for 10s of every 30s

⁴ Heavy Use: Continuous RFID inventories for 59s of every 60s

⁵ When operating in the "Eco" battery saver mode.

⁶ Compatible Bluetooth[®] stack required in the Host device

⁷ Tag Read/Write performance is dependent on tag type, items tagged, number of tags in the field and other radio and environmental factors

⁸ Artificial lighting can affect scanning performance

⁹ Open field

3166 SPECIFICATIONS

Peripherals and Accessories

External interface:	8-way sealed connector with gold plated contacts.
Bundled items:	Battery.
Other accessories available:	Docking Station with power supply and Mini USB cable. Adapter mounts for a variety of smartphones and handheld terminals.

Regulatory

Regions	EU (CE), USA (FCC), Canada (see page 4 for details)
FCC ID	S6J3166
IC	8948A-3166
EMC	EN 55032:2015 +AC:2016 EN 55024:2010 +A1:2015 EN 301 489-1 V2.2.0 47 CFR Part 15B 15.107, 15.109 ICES-003 Issue 6

RF	EN 300 328 V2.1.1 EN 302 208 V3.1.1 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.0 47 CFR Part 15C 15.247 RSS-247 Issue 2
RF Exposure	EN 50566:2017 EN 62209-2:2010 EN 50663:2017 EN 62479:2010 47 CFR Part 2.1093 RSS-102 Issue 5
Electrical Safety	IEC 62368-1:2014 CB EN 62368-1:2014 +A11:2017 UL 62368-1:2014 CAN/CSA C22.2 No. 62368-1-14
Environmental	2011/65/EU (RoHS 2) Restriction of the use of certain Hazardous Substances in electrical and electronic equipment 2015/863 (RoHS 3) Amendment to Annex II of 2011/65/EU

MOUNTS

Connect Enterprise Hand-Held Terminals using ePop-Loq® mounts:



Warranty

The TSL® 3166 reader is warranted against manufacturing defects for a period of one year (12 months) from date of shipment, provided the product remains unmodified and is operated under normal and proper conditions.

Full warranty information can be downloaded from the TSL® website at www.tsl.com/warranty.

Terms

"Made for iPod," "Made for iPhone," and "Made for iPad" mean that an electronic accessory has been designed to connect specifically to iPod, iPhone, or iPad, respectively, and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPod, iPhone, or iPad may affect wireless performance. iPad, iPhone, iPod and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries.

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20th February 2024

3166 PART NUMBERS

Countries

Part Numbers

Notes

ETSI Lower Band

Albania	Georgia (Licence Required)	Malta
Andorra	Germany	Martinique
Austria	Greece	Monaco
Belgium	Greenland	Montenegro
Bhutan	Guernsey	Netherlands
Bosnia & Herzegovina	Guadeloupe	Norway
Bulgaria	Hungary	Poland
Croatia	Iceland	Portugal
Cyprus	Ireland	Romania
Czech Republic	Italy	Slovakia
Denmark	Jersey	Slovenia
Estonia	Latvia	Spain
Falkland Islands	Liechtenstein	Sweden
Finland	Lithuania	Switzerland
France	Luxembourg	United Kingdom
French Guiana	Macedonia	

With 2D barcode imager:
3166-ES1

No barcode imager:
3166-EX1

- ETSI Lower Band
- Operating frequency: 865 – 868 MHz
- 4 Channels

ETSI Upper Band

Albania	France	North Macedonia
Austria	Hungary	Norway
Bulgaria	Ireland	Slovakia
Cyprus	Liechtenstein*	Slovenia
Czech Republic	Lithuania	Sweden
Denmark	Luxembourg	Switzerland*
Estonia	Malta	United Kingdom
Finland	Moldova	

With 2D barcode imager:
3166-ES1-UP

No barcode imager:
3166-EX1-UP

- ETSI Upper Band
- Operating frequency: 916 - 919MHz
- Each country listed may have further restrictions/requirements - the latest GS1 list (that TSL is aware of at date of publication) is: [Overview of UHF Frequency Allocations \(November 2022\)](#)

*Limited implementation of 2018/1538/EU

FCC

Bangladesh	Guam
Canada	Guatemala
Colombia	Northern Mariana Islands
Ecuador	Puerto Rico
El Salvador	United States of America

With 2D barcode imager:
3166-AS1-US

No barcode imager:
3166-AX1-US

- FCC
- Operating frequency: 902 – 928 MHz
- 50 Channels






If you are interested in purchasing for a country/region that is not listed above, please contact enquiries@tsl.com for assistance.

Accessories

Part Numbers

1166/2166/3166 Docking Station Kit, 65W PSU and Mini USB lead	1166-CRD-01-KIT
Line Cord (UK Plug, 1m)	IEC-1M-UK
Line Cord (US Plug, 1.8m)	IEC-1.8M-US
Line Cord (EU Plug, 1.8m)	IEC-1.8M-EU
1166/2166/3166 External Battery Charger. Includes PSU and UK Line Cord	1166-BC-UK
1166/2166/3166 External Battery Charger. Includes PSU and US Line Cord	1166-BC-US
1166/2166/3166 External Battery Charger. Includes PSU and EU Line Cord	1166-BC-EU
Spare Battery - Rechargeable Lithium Polymer for 1166/2166/3166 UHF Reader	1166-00-BA-3000

TSL® RFID Apps

-  RFID Explorer
www.tsl.com/apps/rfid-explorer
-  RFID Tag Finder
www.tsl.com/apps/rfid-tag-finder
-  RFID Web Wedge
www.tsl.com/apps/rfid-web-wedge
-  RFID Scan Scan Write
www.tsl.com/apps/rfid-scan-scan-write
-  TSL® Reader Configuration
www.tsl.com/apps/tsl-reader-configuration

ABOUT TSL®



Technology Solutions UK Ltd (TSL®), part of HID, is a leading manufacturer of high performance mobile RFID readers used to identify and track products, assets, data or personnel.

For over two decades, TSL® has delivered innovative data capture solutions to Fortune 500 companies around the world using a global network of distributors and system integrators. Specialist in-house teams design all aspects of the finished products and software ecosystems, including electronics, firmware, application development tools, RF design and injection mould tooling.

TSL® is an ISO 9001:2015 certified company.



ISO 9001: 2015

CONTACT

Address:	Technology Solutions (UK) Ltd, Suite A, Loughborough Technology Centre, Epinal Way, Loughborough, Leicestershire, LE11 3GE, United Kingdom.
Telephone:	+44 1509 238248
Fax:	+44 1509 214144
Email:	enquiries@tsl.com
Website:	www.tsl.com

ABOUT HID



HID powers the trusted identities of the world's people, places and things. We make it possible for people to transact safely, work productively and travel freely. Our trusted identity solutions give **people** convenient access to physical and digital **places** and connect **things** that can be identified, verified and tracked digitally. Millions of people around the world use HID products and services to navigate their everyday lives, and billions of things are connected through HID technology. We work with governments, educational institutions, hospitals, financial institutions, industrial businesses and some of the most innovative companies on the planet. Headquartered in Austin, Texas, HID has over 4,000 employees worldwide and operates international offices that support more than 100 countries. HID is an ASSA ABLOY Group brand.

For more information, visit www.hidglobal.com.

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