BOOST CONVERTERS FOR BATTERY-POWERED APPLICATIONS

Designed for Applications in

MonolithicPower.com

Table of Contents

Why Are Boost Converters Needed?

Most scenarios that require a boost converter, also called a step-up converter, are battery applications. In these applications, it is common that a battery output is low (for example, 1.5V_{OUT} from a single AA battery), while the back-end IC or subsidiary circuit requires a higher input voltage. Therefore, a boost converter is required to convert the battery's low voltage to a higher voltage.

Common Battery Types that Require a Boost Converter

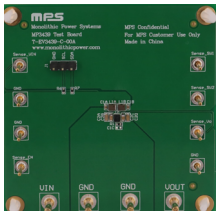
Type/Spec	Cylindrical Batteries				Coin Batteries			Phone/Tablet Batteries
	NiMH	Lithium-Iron	Lithium-Ion	NiCd	CR	SR	LR	Lithium-Ion
Output	1.2V	1.5V	3.7V	1.2V	3V	1.55V	1.5V	3.7V
Sizes	A/AA/AAA/AAAA/C/D/N/F				Varies			

MPS Advantages

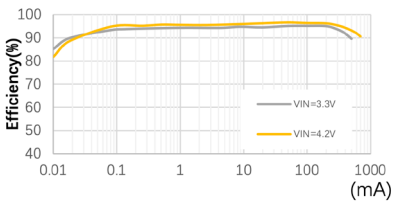
MPS offers a large portfolio of boost converters for battery-powered applications. By combining our optimized IC process, packaging technology, monolithic design, and system expertise, MPS provides high-efficiency, small-sized battery management products with integrated low-$R_{DS(ON)}$ MOSFETs, low quiescent current, high efficiency, low ripple, and low noise. These products are easy to use with either built-in trim options for convenient configuration or software (digital) programmability via an I^2C interface with a one-time programmable (OTP) memory for many key features, such as current limit, output voltage, switching frequency, external sync, operation mode (PFM/PWM, FCCM), protection modes (latch-off, hiccup), and protection thresholds (OVP, UVP, OCP, and OTP).

With exceptional power density and efficiency, our family of boost converters offers input ranges from as low as 0.6V, output ranges as high as 90V, and switching current limits up to 25A with both non-synchronous and synchronous configurations.

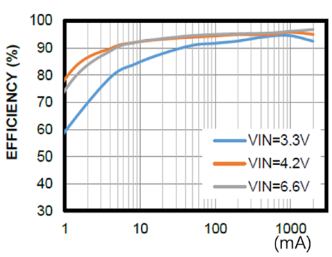
Small Size



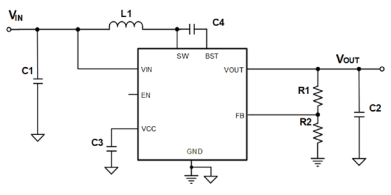
Low Quiescent Current



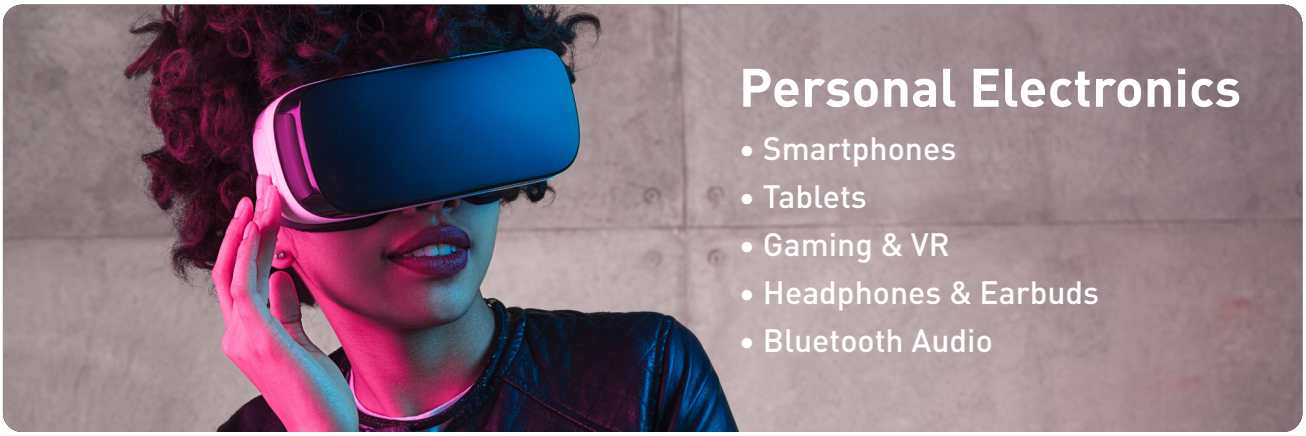
High Efficiency



Few External Components



Applications



Personal Electronics

- Smartphones
- Tablets
- Gaming & VR
- Headphones & Earbuds
- Bluetooth Audio

IoT

- Smart Cameras
- GPS Trackers
- Sensors
- Security
- RF Remote Controls

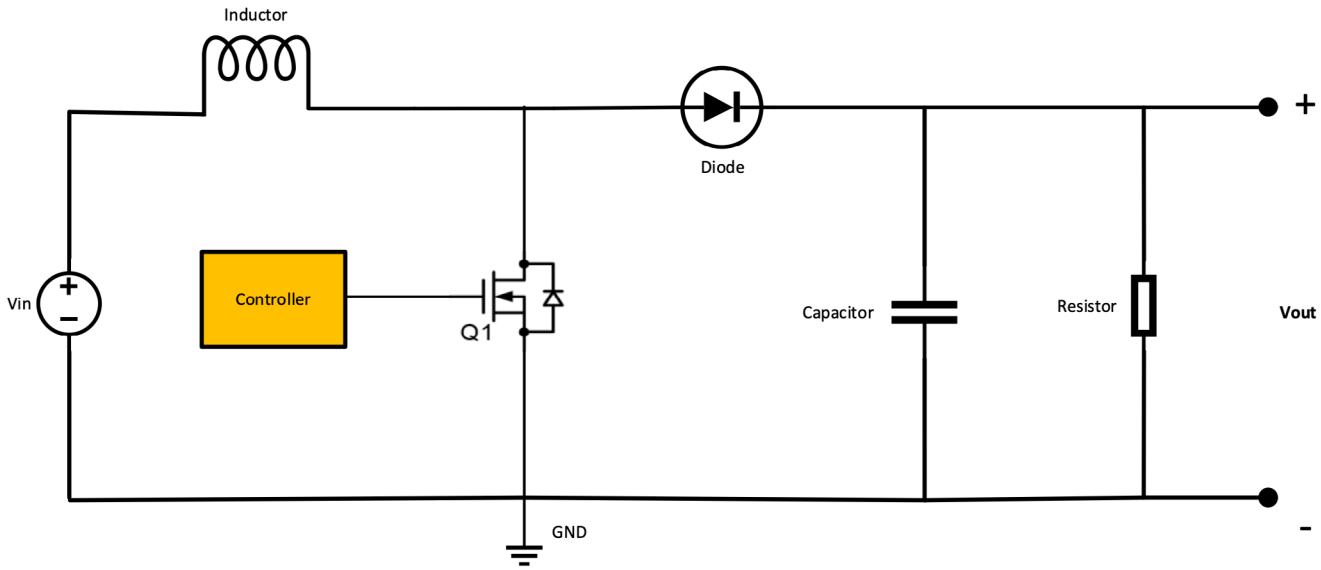
Medical

- Insulin Pumps
- CGM (Continuous Glucose Monitors)
- Thermometers
- Capsule Endoscopy
- Drug Delivery Systems

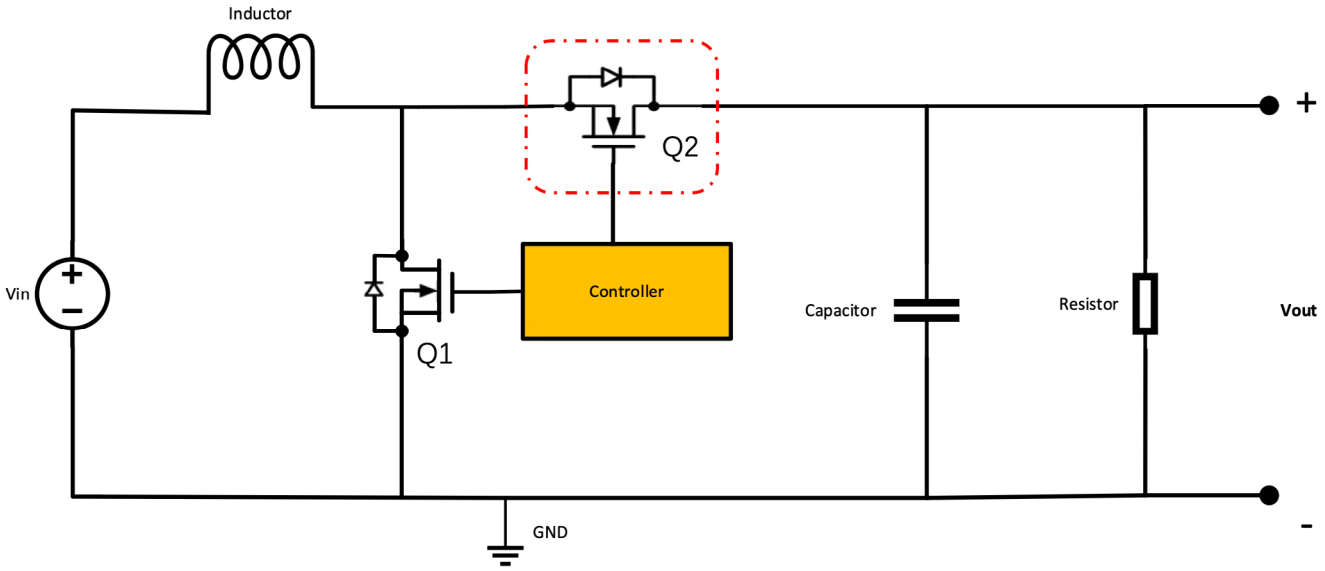
Additional Applications

- Portable Printers
- Smart Meters
- E-Cigarettes
- Point-of-Sale (POS) Machines

The Benefits of Synchronous Boost Converters



Non-Synchronous Boost Converter



Synchronous Boost Converter

What Is Synchronous Rectification?

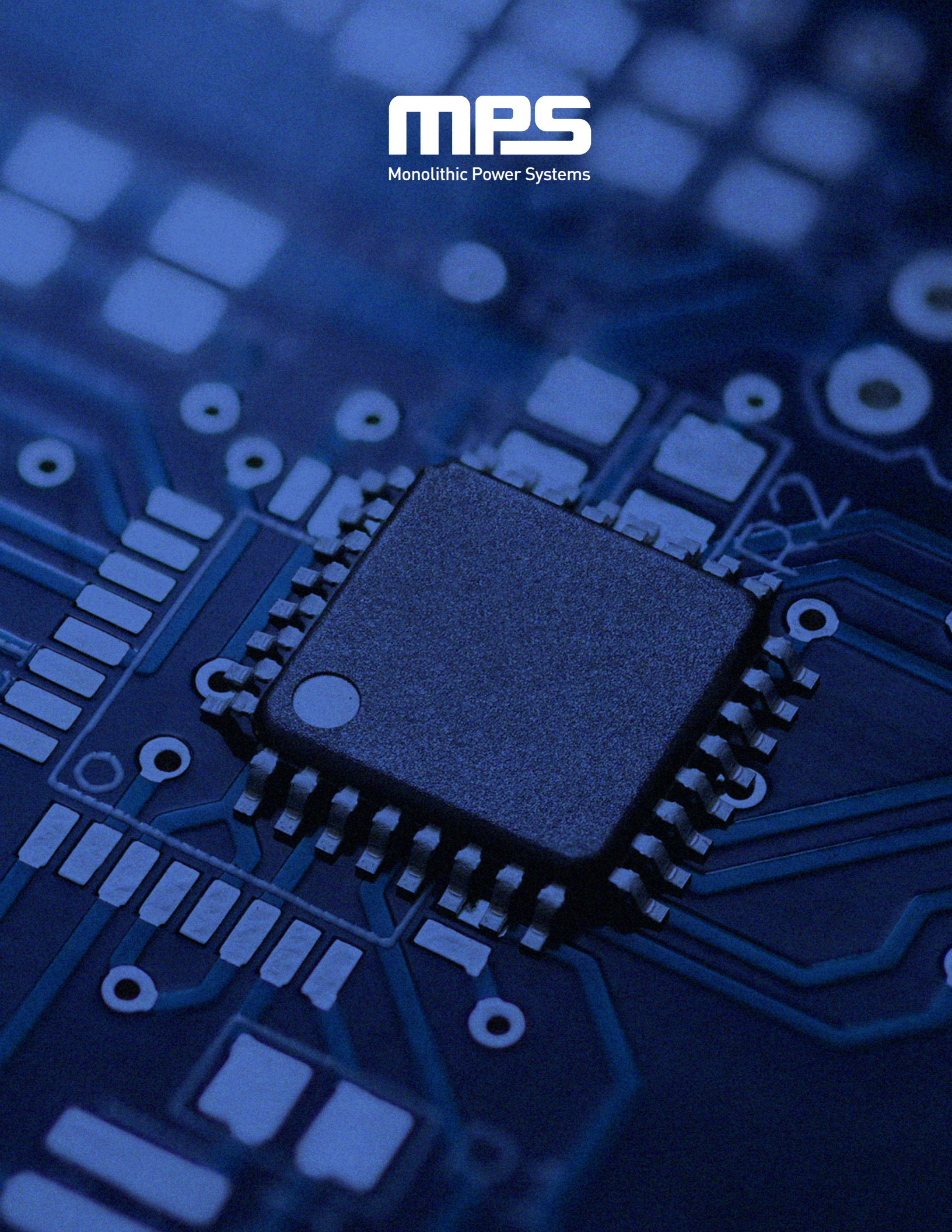
In a synchronous boost converter, the Schottky diode is replaced by a MOSFET, and the two MOSFETs are driven in a complementary way with a small dead time between their conduction intervals to avoid shoot-through.

Benefits of Synchronous Rectification

When synchronous FETs are paralleled in applications, they have better efficiency, lower power dissipation, better thermal performance, increased quality, and improved manufacturing yields though automated assembly processes (higher reliability).

Part Selection Table

Part Number	Sync	V_{IN} (Min) (V)	V_{IN} (Max) (V)	V_{OUT} Max Range (V)	I_{SW} Limit (Typ) (A)	I_Q (Typ) (mA)	f_{SW} (kHz)	Package (mm)
MP1541	-	2.5	6	3 to 22	1.9	0.635	1300	TSOT23-5, QFN-8 (2x2)
MP1542	-	2.5	22	3 to 22	2	0.7	700/1300	MSOP-8
MP3120	✓	0.8	5	2.5 to 22	1.2	0.47	1000	TSOT23-6
MP3221	-	2.5	6	3 to 6	3.7	0.27	1200	TSOT23-6
MP3410	✓	1.8	6	2.5 to 6	1.3	0.36	550	TSOT23-5
MP3414A	✓	1.8	5.5	5.5 max	3.6	0.022	1000	TSOT23-8
MP3414E	✓	0.8	4	1.8 to 4	1.8	0.035	1000	TSOT23-8
MP3415	✓	1.8	5.5	5.5 max	4.2	0.022	1000	QFN-12 (2x2)
MP3416	✓	1.25	5.5	1.8 to 5.5	1.1	0.0095	1500	TSOT23-5, QFN-8 (2x2)
MP3418	✓	0.6	4	1.8 to 4	0.4	0.038	1200	TSOT23-8
MP3421	✓	1.9	5.5	2.5 to 5.5	5.5	0.043	600	QFN-14 (2x2)
MP3422	✓	1.9	5.5	2.5 to 5.5	6.5	0.043	600	QFN-14 (2x2)
MP3423	✓	1.9	5.5	2.5 to 5.5	9	0.043	600	QFN-14 (2x2)
MP3424	✓	2	5.5	3 to 5.5	9.5	0.32	580	QFN-14 (2x2)
MP3425	-	3.1	22	3.1 to 55	5	0.65	300 to 2000 (programmable)	QFN-14 (3x4)
MP3426	-	3.2	22	3.2 to 35	8.5	0.65	300 to 2000 (programmable)	QFN-14 (3x4)
MP3428A	✓	3	20	V_{IN} to 22	25	0.65	600	QFN-22 (3x4)
MP3429	✓	2.7	13	V_{IN} to 16	21.5	0.45	600	QFN-13 (3x4)
MP3431	✓	2.7	13	V_{IN} to 16	21.5	0.45	600	QFN-13 (3x4)
MP3432	✓	2.7	13	V_{IN} to 16	10	0.51	600	QFN-13 (3x4)
MP3213	-	2.5	22	3 to 22	2.7	0.7	700/1300	MSOP-8E, QFN-10 (3x3)
MP3435	✓	3	20	V_{IN} to 22	25	0.65	600	QFN-20 (3x4)
MP3436	✓	2.7	16	V_{IN} to 16	6	0.43	600	TSOT23-8
MP3437	✓	2.7	16	V_{IN} to 16	9.5	0.43	600	TSOT23-8, QFN-10 (2x2.5)
MP3438	✓	2.7	16	V_{IN} to 16	2	0.3	1200	SOT583 (1.6x2.1)
MP3439	✓	2.7	5	5 to 5.5	7	0.023	1000/2000	WLCSP-20 (1.75x2.10)
MP3209	-	2.5	6	3 to 22	0.35	0.635	1400	TSOT23-5, UTQFN-8 (2x2)
MP3217	-	2.5	6	V_{IN} to 36	0.5	0.46	670	TSOT23-6
MP3430	-	2.7	5.5	2.7 to 90	0.9	0.3	1300	QFN-16 (3x3)
MP3212	-	2.3	5.5	28V max	1.3	0.4	1000	QFN-10 (3x3)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