

# XR76203/5/8-Q AEC-Q100 Qualified

## 40V, 3A/5A/8A Synchronous Step Down Regulators

### Key Features

- Automotive AEC-Q100 Qualified
- 3A/5A/8A step down regulators
  - Wide 5.5V to 40V input voltage range
  - $\geq 0.6V$  adjustable output voltage
- Proprietary constant on-time control
  - Programmable 200ns-2 $\mu$ s on-time
  - Constant 100kHz-800kHz switching frequency
  - Stable with ceramic output caps
  - No loop compensation required
- Selectable CCM or CCM/DCM modes
  - CCM/DCM for high efficiency at light-load
  - CCM for constant frequency at light-load
- Programmable hiccup current limit with thermal compensation
- Precision enable and power-good flag
- Programmable soft-start
- 5x5mm QFN package with wettable flanks - common scalable footprint

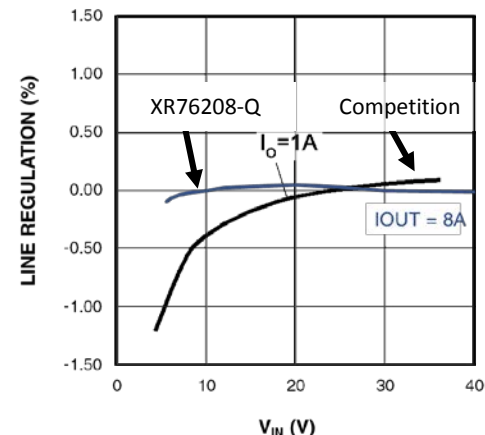
### Applications

- Automotive Systems
- Point of Load Conversion
- Distributed Power Architecture
- FPGA/DSP/Processor Supplies
- Power Supply Modules
- Industrial and Military



### Benefits

- Automotive AEC-Q100 Qualified
  - Temp Grade 1: -40°C to 125°C
  - HBM ESD Class Level 2
  - CDM ESD Class Level C4B
- Controller, drivers, bootstrap diode and MOSFETs integrated in one package
- 40V input voltage range allows rectification of 24V AC +15% for line regulation in the input + 15%
- Excellent line and load regulation
- High efficiency



### Key Competitive Advantages

#### Standard COT from MPS, Semtech, IR

- Superior line/load regulation

#### DCAP/DCAP2/DCAP3 from TI

- Superior line/load regulation
- Faster transient response with ability to work with low ESR capacitors

### Availability & Tools

#### In Production

- XR76205-Q (5A)
- Tiny 5x5mm QFN-30
- Evaluation Boards

#### In Development

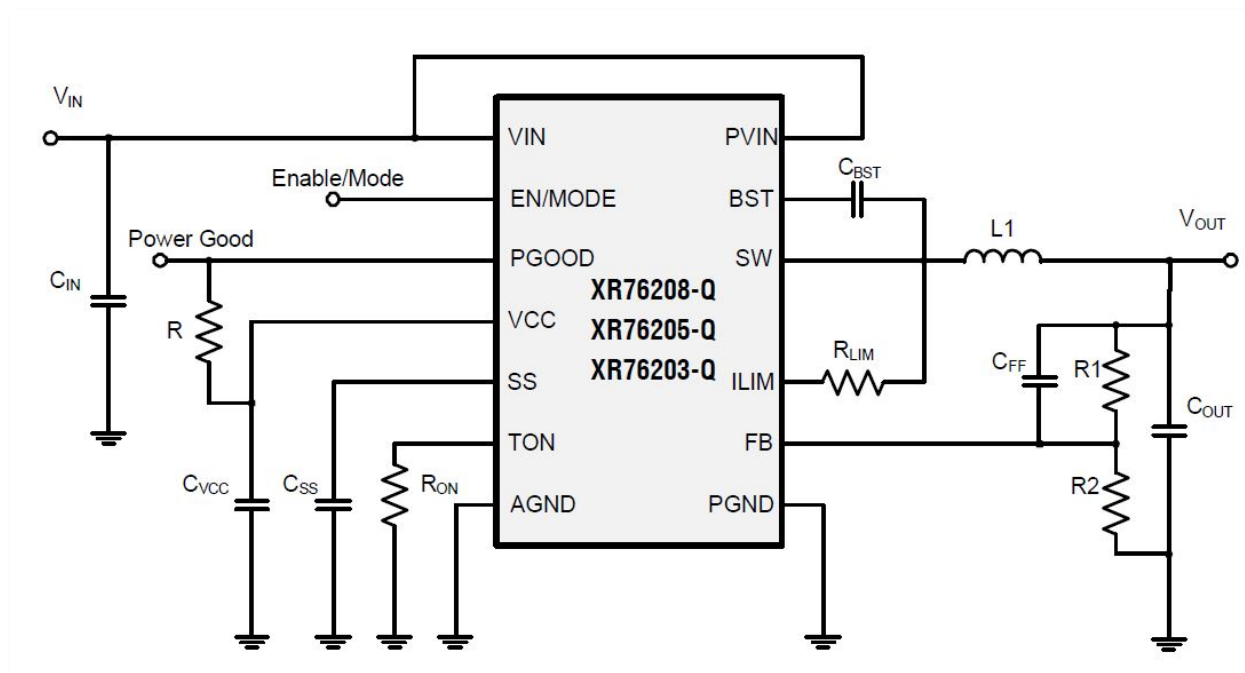
- XR76208-Q (8A)
- XR76203-Q (3A)
- Tiny 5x5mm QFN-30
- Evaluation Boards



# XR76203/5/8-Q

## Typical Application Schematic

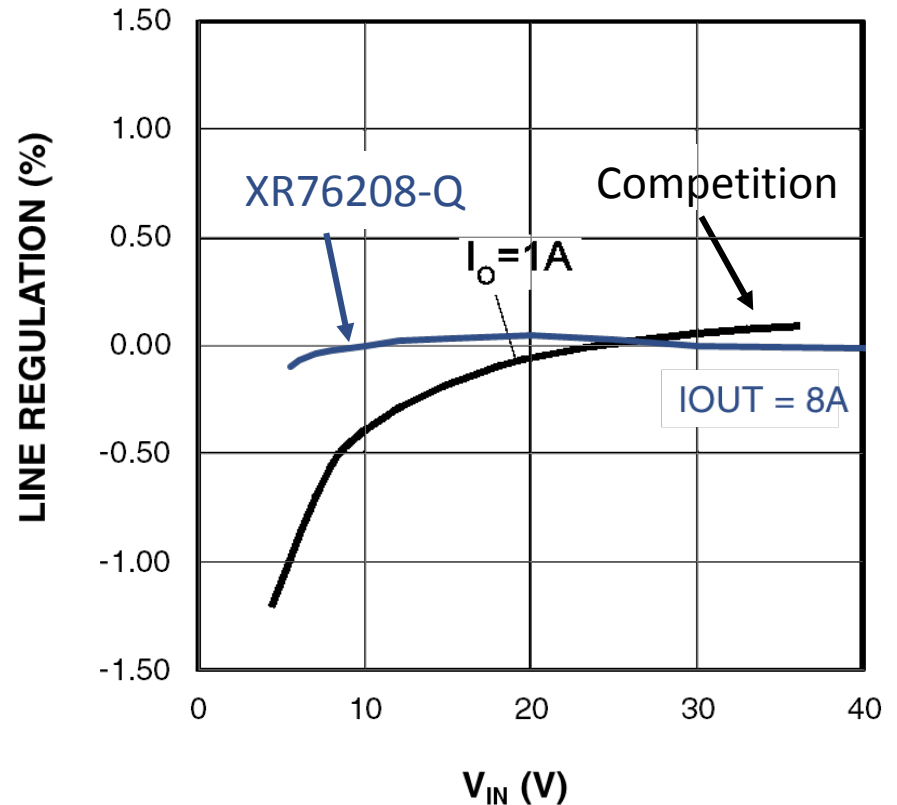
- No switch node feed-forward compensation components required
- 5V to 40V continuous input voltage range
  - PVIN range 3V to 40V with 5V bias
- Adjustable frequency
- Adjustable current limit
- Internal Vcc regulator



# XR76203/5/8-Q

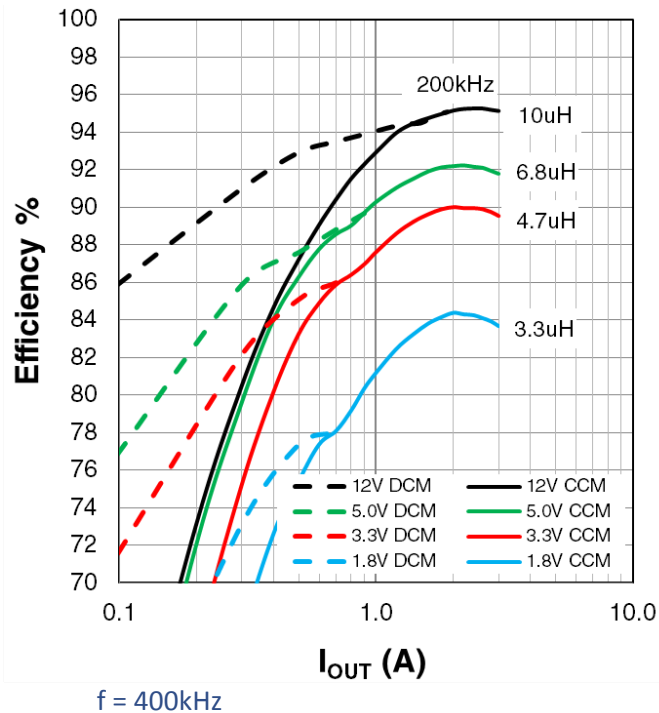
## Competitive Advantages

- 40V input voltage range
- Superior line and load regulation
- Fast transient response
- No switch node feed-forward compensation components required
- Excellent efficiency

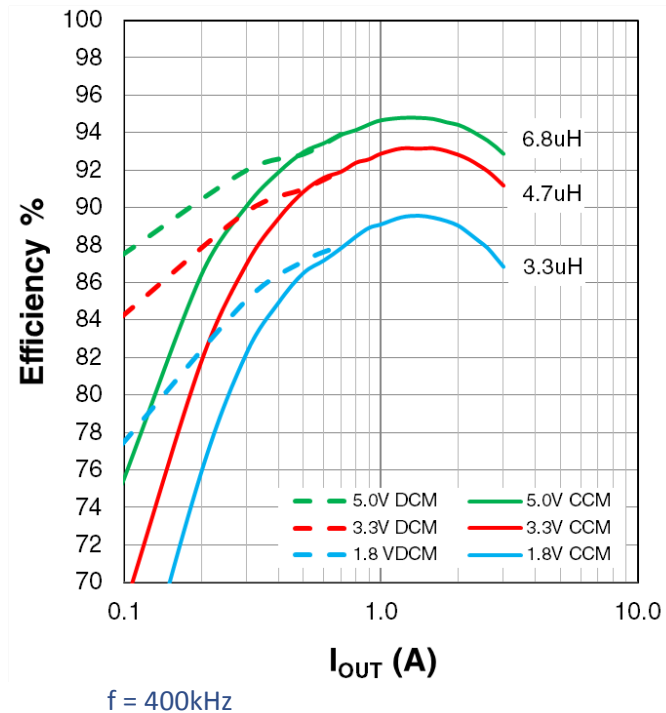


# XR76203-Q Efficiency

$V_{IN} = 24V$

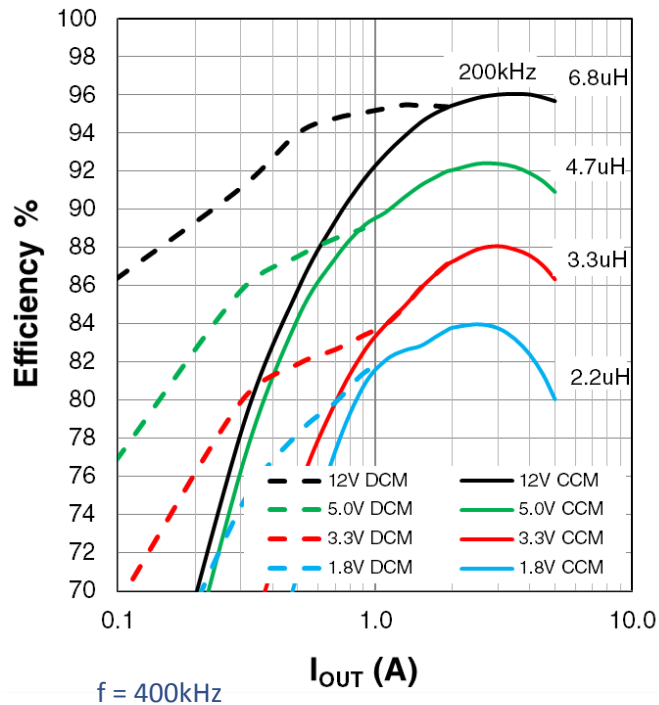


$V_{IN} = 12V$

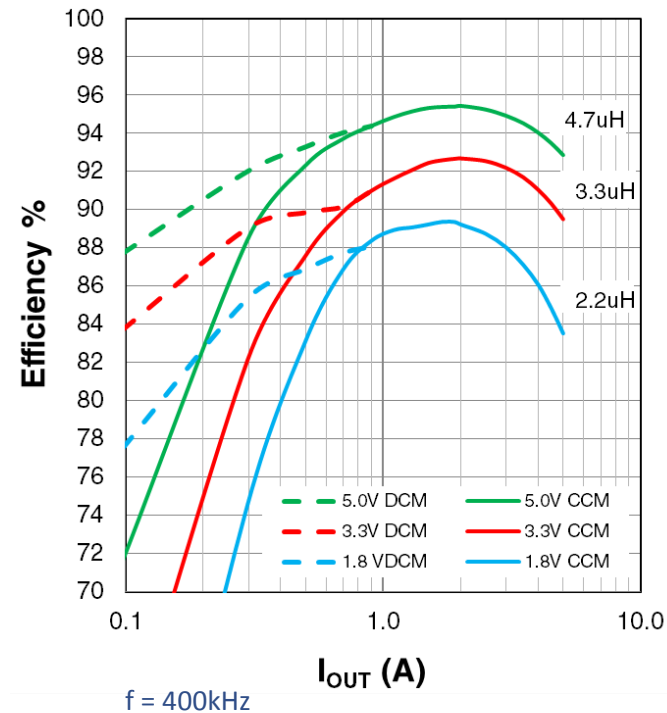


# XR76205-Q Efficiency

VIN = 24V

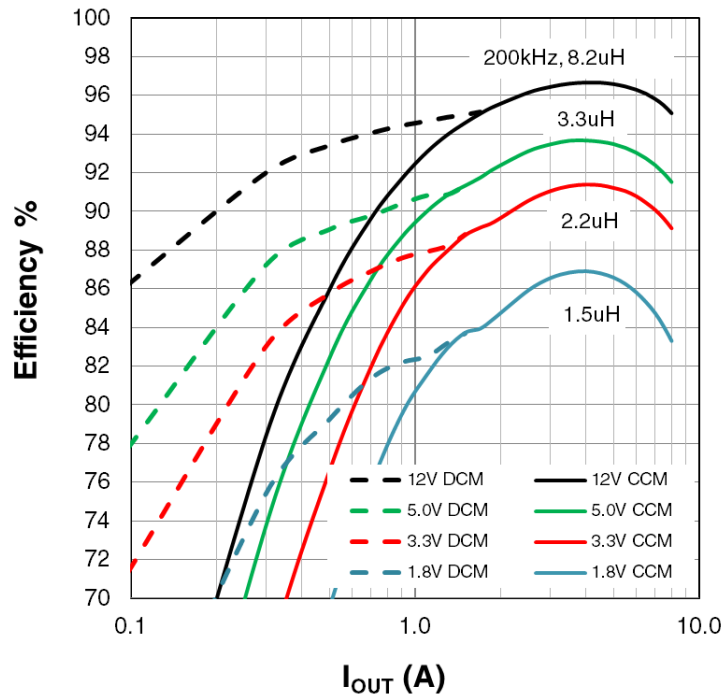


VIN = 12V



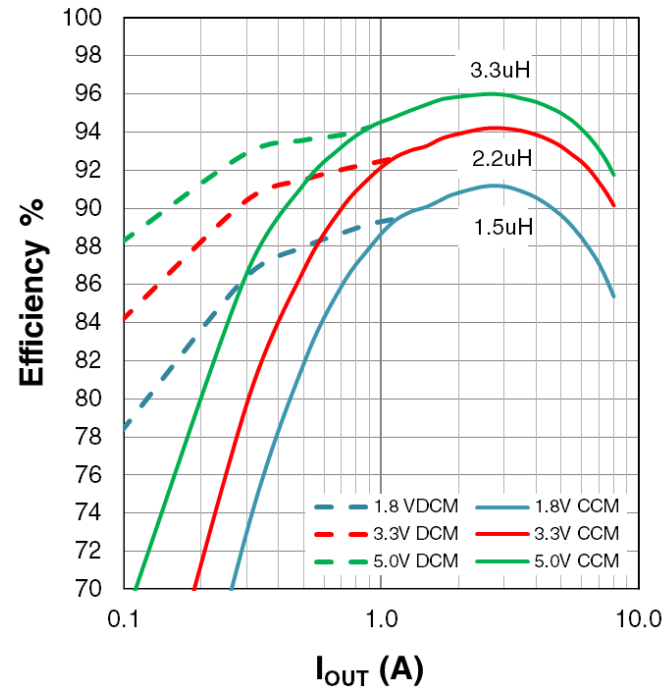
# XR76208-Q Efficiency

VIN = 24V



f = 400kHz

VIN = 12V

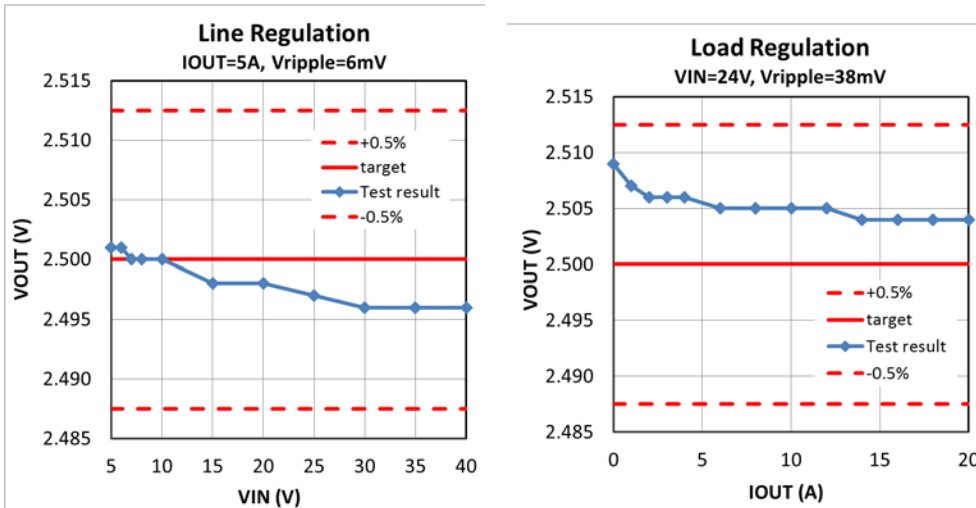


f = 400kHz

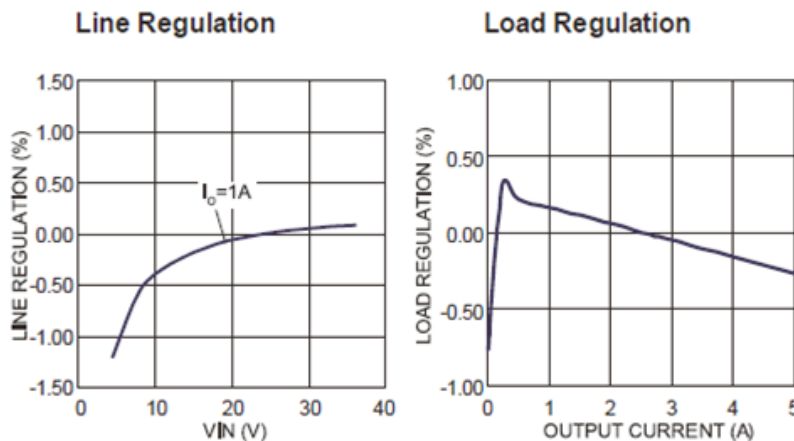
# Exar's Proprietary Constant On-Time Control

## Provides Better Line/Load Regulation

### Exar's Constant On-Time Control (COT)



vs. Standard COT from MPS, Semtech, IR

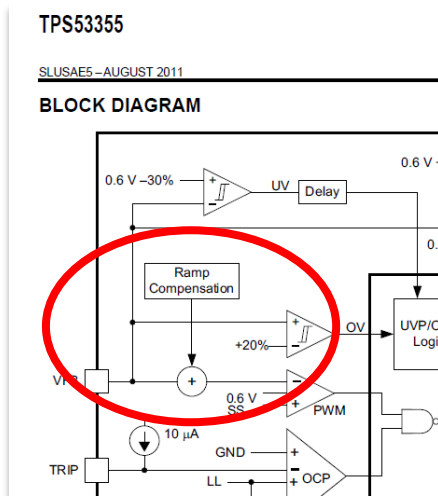


- Exar COT architecture results in excellent line and load regulation
- Exar's Patented Emulated Current Mode COT used in several product families
  - XRP6141
  - XR75100
  - XR76108/12/15
  - XR76203/5/8
  - XR76203/5/8-Q
  - XR79110/15/20
  - XR79103/6
  - XR79203/6
  - XR76117/21



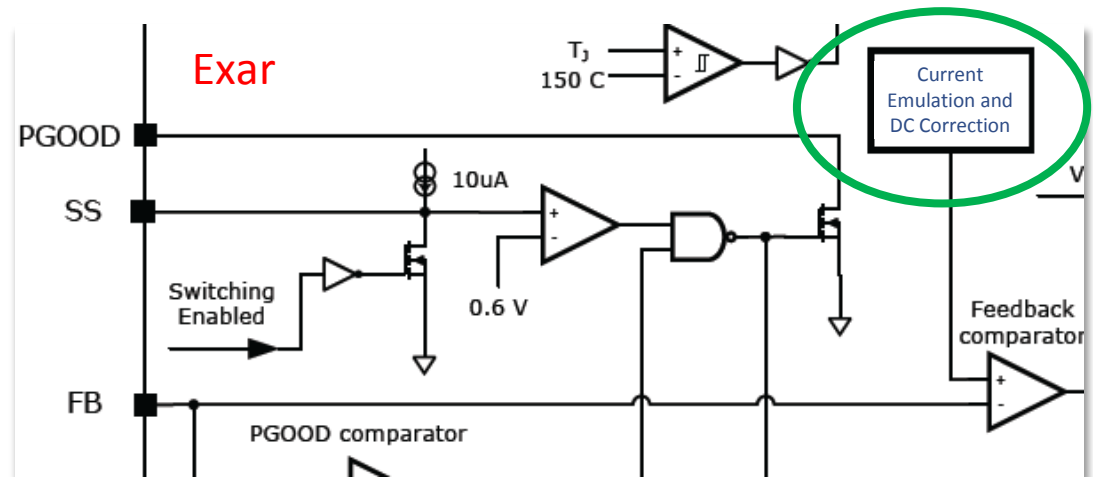
# Why Exar Transient is Superior

- From TPS5158 data sheet:
  - Adaptive On-Time Modulation with Selectable Control Architecture
    - D-CAP™ Mode at 350 kHz for Fast Transient Response
    - D-CAP2™ Mode at 350 kHz for Ultra-Low/Low ESR Output Capacitor



DCAP2/3 conditions the FB signal introducing delays

- Exar COT architecture unaffected
  - You can have both fast transient response and the ability to work with low ESR caps



Exar COT conditions the reference giving the architecture the speed customers expect of a constant on-time control



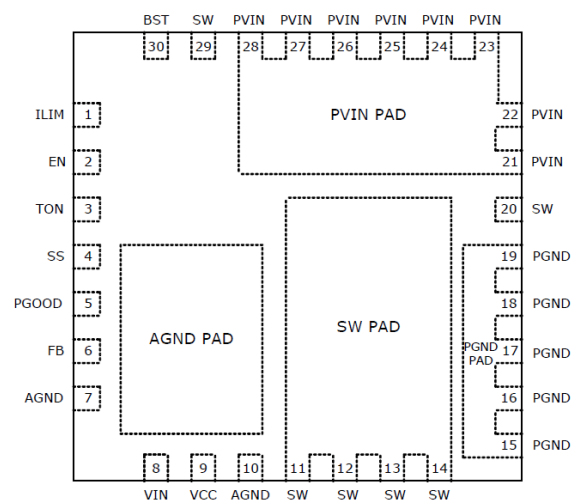
# XR76203/5/8 Ordering Information and Pinout

Part Number	Operating Temperature Range	Lead-Free	Package	Packaging Method
XR76208EL-Q <sup>3</sup>	-40°C ≤ T <sub>J</sub> ≤ 125°C	Yes	5x5mm QFN	Tray
XR76208ELTR-Q <sup>3</sup>				Tape and Reel
XR76208EVB-Q <sup>3</sup>	XR76208-Q Evaluation Board			
XR76205EL-Q	-40°C ≤ T <sub>J</sub> ≤ 125°C	Yes	5x5mm QFN	Tray
XR76205ELTR-Q				Tape and Reel
XR76205EVB-Q	XR76205-Q Evaluation Board			
XR76203EL-Q <sup>3</sup>	-40°C ≤ T <sub>J</sub> ≤ 125°C	Yes	5x5mm QFN	Tray
XR76203ELTR-Q <sup>3</sup>				Tape and Reel
XR76203EVB-Q <sup>3</sup>	XR76203-Q Evaluation Board			

Notes:

1. Refer to [www.exar.com/XR76203-Q](http://www.exar.com/XR76203-Q), [www.exar.com/XR76205-Q](http://www.exar.com/XR76205-Q), [www.exar.com/XR76208-Q](http://www.exar.com/XR76208-Q) for most up-to-date Ordering Information.
2. Visit [www.exar.com](http://www.exar.com) for additional information on Environmental Rating.
3. Preliminary

Refer to Product Data Sheet for latest information



5mm x 5mm QFN

