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Power Management ICs

Voltage Detectors

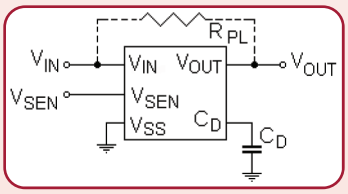
With accuracy as high as 0.8 percent and current consumption as low as 0.4µA, these high-precision, low-power voltage detectors are designed for a variety of power-efficient mobile and battery-powered consumer electronics and medical applications. They can detect input voltages ranging from 0.8V to 6V, with 0.1V increments. Either 'CMOS' or 'open drain' output configuration is available. Additional features include separate 'SENSE' input, adjustable or pre-programmed 'Release Time,' watchdog function, and manual reset.

Manufactured using laser trimming technology, they are ideal for microprocessor reset circuitry, battery back-up circuits, power failure detection, power-on reset circuits, or battery life and voltage monitors. The base part numbers are IXD5118, IXD5120, IXD5121-24, IXD5126, and IXD5127; there are a number of product series/options that Zilog and IXYS customers can choose from.

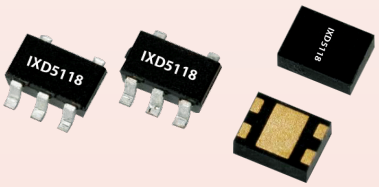
The new voltage detectors are available in the following ultra-small packages: USP-3 (1.2mm x 1.2mm x 0.6 mm), USP-4 (1.2mm x 1.6mm x 0.6mm), SSOT-24 (2.0mm x 2.1mm x 1.1mm), SOT-25 (2.8mm x 2.9mm x 1.3mm), USP-6C (1.8mm x 2.0mm x 0.6mm), USPN-4 (0.9mm x 1.2mm x 0.38mm), and USPN-4B02 (0.95mm x 0.75mm x 0.38mm).

IXD5118 Features

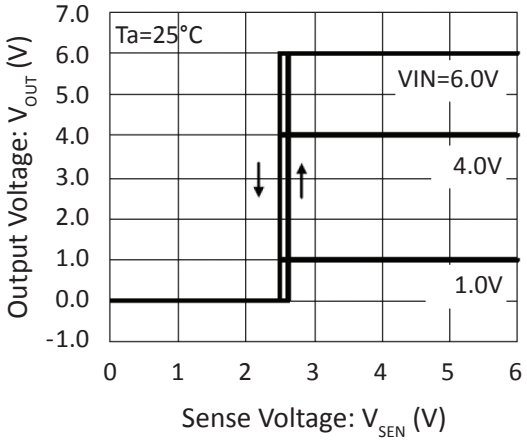
- Operating voltage range: 1V-6V
- Detect voltage range: 0.8V-5V (0.1V increments)
- Accuracy ±2% at Detect Voltage ≥ 1.5V
- Detect voltage temperature drift: ±100 ppm/°C
- Low power consumption: 0.4µA (detect at V_{IN} = 1V)
  0.6µA (release at V_{IN}=1V)
- Output configuration: CMOS or open drain
- Adjustable release time
- Packages: SOT-25, USP-4



IXD5118 schematic



IXD5118: output voltage vs. sense voltage



Part Number	Accuracy (%)	Current Consumption, (detect/release) (µA)	Detect Voltage Range (V)	Output Configuration		Additional Features
				CMOS	Open Drain	
IXD5108	± 2.0	0.6/0.8	0.8 – 5.0	Yes	Yes	Separated SENSE input, adjustable release time
IXD5109	± 2.0	0.8/0.9	0.8 – 5.0	Yes	Yes	Adjustable release time, SSOT-24 ultra-small package
IXD5118	± 2.0	0.4/0.6	0.8 – 5.0	Yes	Yes	Separated SENSE input, adjustable release time
IXD5120	± 2.0	0.6/1.7	0.7 – 5.0	Yes	Yes	USP-3 ultra-small package: 1.2 x 1.2 x 0.6mm
IXD5121-24	± 2.0	0.4/0.6	1.0 – 6.0	No	Yes	Watchdog, preprogrammed release time
IXD5126	± 0.8	0.6/1.3	1.5 – 5.5	Yes	Yes	USPN-4B02 ultra-small package: 0.95 x 0.75 x 0.38mm
IXD5127	± 0.8	0.6/0.7	1.5 – 5.5	Yes	Yes	Preprogrammed release time, manual reset

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Low Dropout Linear Regulators

Featuring output voltage accuracy as high as 0.02 percent, current consumption as low as 0.6µA, and excellent line and load regulation, these low dropout (LDO) linear regulators can be used in various portable, battery-powered consumer electronic devices and automotive infotainment systems.

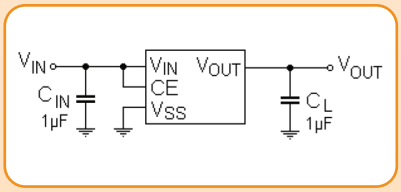
The input voltages of the LDOs range from 0.5V to 28V and the output voltages from 0.5V to 23V. The output currents are from 150mA to 1A. Besides these single output devices, dual output versions also available. In addition, negative voltage regulators with output voltages ranging from (-2.5V) to (-12V) are being released. All of the LDOs are internally compensated for stability, allowing the use of low ESR ceramic capacitors at the outputs. Other features include soft start, thermal shutdown, over-current protection, under voltage lockout, and ON/OFF switch.

Manufactured using CMOS technology and trimmed with laser, they are well-suited for smart phones, portable game consoles, digital still cameras, digital audio equipment, reference voltage sources, or power supplies for low-power medical devices. Some example base part numbers include IXD1201, IXD1233, IXD1601, IXD1701, and IXD4902.

These new linear regulators are available in compact packages, including USP-4 (1.2mm x 1.6mm x 0.6mm), SSOT-24 (2.0mm x 2.1mm x 1.1mm), SOT-25 (2.8mm x 2.9mm x 1.3mm), USP-6C (1.8mm x 2.0mm x 0.6mm), USPN-6 (1.3mm x 1.3mm x 0.38mm), and USPN-4B02 (0.95mm x 0.75mm x 0.38mm).

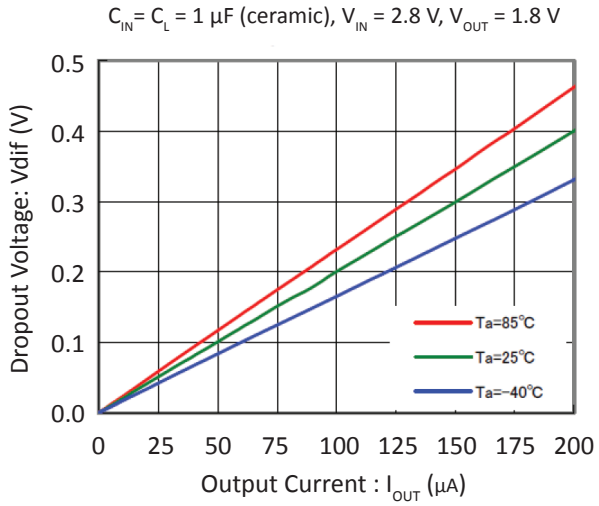
IXD1233 Features

- Operating voltage range: 1.7V-5.5V
- Output voltage range: 1.2V-3.6V (0.05V increments)
- Output current up to 200mA
- Dropout voltage: 240mV at 200mA
- Output voltage accuracy: ±1%
- Ripple rejection: 75dB at 1kHz
- Stable with low ESR ceramic capacitor at output
- Standby current less than 0.1µA (typical)
- Current limit and short circuit protection
- Packages: SOT-25, SSOT-24, USP-4



IXD1233 schematic

IXD1233: Dropout Voltage vs. Output Current



Part Number	Accuracy (%)	Current Consumption (µA)	Max Input Voltage (V)	Output Voltage Range (V)	Max Output Current (mA)	Additional Features
IXD1201	± 1.0	2.0	10	1.3 – 6.0	250	Ultra low power consumption, three-terminal regulator
IXD1204/05	± 2.0/± 1.0	80/70	12	0.9 – 6.0	150	High ripple rejection factor, Chip Enable function
IXD1209/12	± 2.0	25	10	0.9 – 6.0	150	ON/OFF switch
IXD1216	± 2.0	50	28	2.0 – 23.0	150	ON/OFF switch, adjustable output voltage
IXD1233	± 1.0	45	6.0	1.7 – 5.5	200	High speed, inrush current prevention
IXD1415	± 1.0	28 (per channel)	6.0	0.8 – 5.0	200	Dual outputs, ON/OFF switch
IXD1421	± 1.0	90 (per channel)	5.5	1.2 – 3.6	300	Dual outputs, high speed, ON/OFF switch
IXD1503	± 1.0	15	6.0	1.2 – 5.0	500	High speed, ON/OFF switch
IXD1504	± 1.0	0.6	6.0	1.1 – 5.9	150	Ultra low power consumption
IXD1701	± 2.0	50	30	1.8 – 18.0	150	ON/OFF Switch, thermal shutdown, Chip Enable function
IXD1702	± 1.0	40	36	1.8 – 18.0	600	High speed, low supply current

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Step-Down (Buck) DC/DC Converters

Zilog's step-down DC/DC converters canprovide high efficiencies above 90 percent. The output voltages are as low as 0.8V and as high as 30V; the load currents can be up to 3A. Low resistance N-Channel MOSFETs are integrated on chip. Devices with on-chip P-Channel MOSFETs are also available for synchronous switching applications. The PWM/PFM auto switching mode utilizes a Discontinuous Conduction Mode (DCM) method, reducing switching losses and improving efficiency at light load conditions. A "power good" signal option is also available for voltage sensitive operations.

Additional features include high-speed soft start, current limit, under voltage lockout (UVLO) function,short circuit protection, thermal shutdown, and load capacitor discharge.

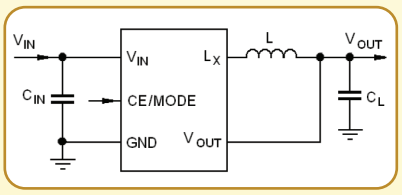
Step-Down DC/DC Converters with Built-In Inductors: Also available are micro buck converters with integrated inductors, which need only two external capacitors to generate a stable output. Housed in tiny packages (2.5mm x 3.2mm x 1.0mm USP-9B01, for instance), these highly efficient devices can operate at a switching frequency of 3MHz and provide extremely fast load transient response.

They are targeted for smart phones, bluetooth headsets, digital still cameras, digital audio equipment, reference voltage sources, digital home appliances, and automotive accessory power supplies. Base part numbers include IXD3271, IXD3252, IXD3243, IXD3235, IXD3221, and IXD9213/14.

The new switching regulators are available in ultra-small packages, including SOP-8FD (4.9mm x 6mm x 1.5mm), TSSOP-16 (5.1mm x 6.4mm x 1.2mm), SOT-25 (2.8mm x 2.9mm x 1.3mm), USP-6C (1.8mm x 2.0mm x 0.6mm), USP-10B (2.6mm x 2.9mm x 0.6mm), USP-10B03 (2.15mm x 2.5mm x 1.00mm) and WLP-5-03 (1.06mm x 1.26mm x 0.23mm).

IXD3235 Features

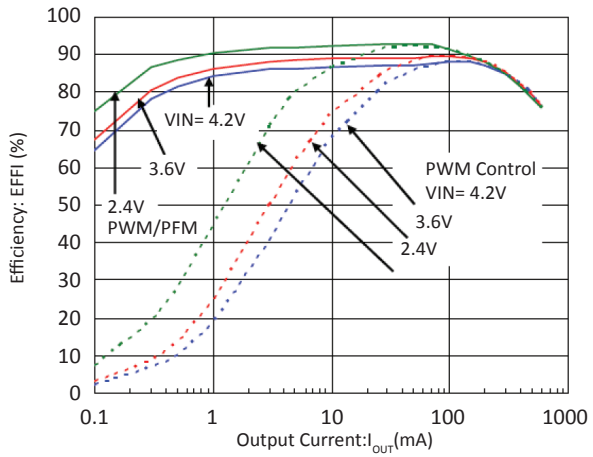
- Integrated low resistance N- and P-Channel MOSFETs
- Input voltage range: 1.8V-6V
- Output voltage range: 0.8V-4V (internally set)
  0.9V-6V (externally set)
- Maximum output current: 600mA
- Switching frequency: 1.2MHz, 3MHz
- High efficiency: 92%
- Packages: SOT-25, USP-6C, USP-6EL, WLP-5-03



IXD3235 Schematic

IXD3235: efficiency vs. output current

(f_{OSC} = 1.2 MHz, V_{OUT} = 1.8 V)
PWM/PFM Automatic Switching mode



Part Number	Accuracy, %	Input Voltage Range, V	Output Voltage Range, V	Output Current, mA	Switching Frequency, MHz	Additional Features
IXD3220/21	± 1.5	2.8 - 16	> 1.2	3000	0.3/0.5/1.0	PWM/PFM mode auto selection, soft start
IXD3235/36/37	± 2.0	1.8 – 6.0	0.8 – 4.0	600	1.2/3.0	PWM/PFM mode auto or manual selection, synchronous rectification, soft start, load capacitor auto discharge in standby mode
IXD3242/43	± 2.0	2.7 – 6.0	0.9 - VIN	2000	1.2/2.4	PWM/PFM mode auto selection, soft start, load capacitor auto discharge in standby mode
IXD3248	± 1.5	4.5 - 18	1.0 – 12.0	2200	0.5	PWM mode, synchronous rectification, soft start, thermal shutdown
IXD3250/51	± 2.0	7.0 - 30.0	1.2 – 12.0	2000	0.3/0.5	PWM/PFM automatic switchover control, soft start, under-voltage lockout, termal shutdown
IXD3252	± 2.0	3.0 - 30.0	1.5 – V_{IN}	2000	0.28/0.5	PWM/PFM automatic switchover control, soft start, under-voltage lockout, termal shutdown
IXD3263/64	± 1.5	3.0 - 18.0	1.0 – 15.0	500	1.2/2.2	PWM/PFM automatic switchover control, soft start, termal shutdown, under-voltage lockout
IXD3265	± 2.0	2.0 - 6.0	1.0 – 4.0	50/200	-	PFM control, ultra-low power, under-voltage lockout, synchronous rectifiation
IXD3270/71	± 2.0	7.0 - 30.0	1.2 – 12.0	2000	0.3/0.5	PWM/PFM automatic switchover control, soft start, under-voltage lockout

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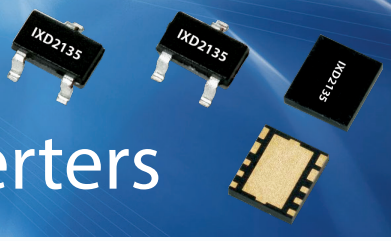


Step-Up (Boost) DC/DC Converters

These high-efficiency step-up convertors can provide output voltages ranging from 1.5V to 30V and operate with input voltages from 0.65V to 10V; the maximum output current is at 500mA. Synchronous rectification is possible with integrated low-resistance N-Channel and P-Channel MOSFETs. An automatic PWM/PFM mode selection is also available to achieve high efficiency at both light loads and heavy ones. These boost converters all have an 'ON/OFF' switch feature which sets them to 'standby mode,' whereby the current consumption is less than 1µA.

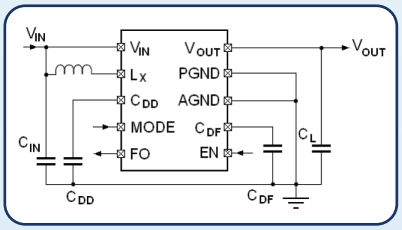
The output voltages can be set by 0.1V step with an accuracy as high as 2 percent. Other features include soft start, load disconnect, under voltage lockout (UVLO), load capacitor auto discharge, thermal shutdown, and current limit.

They are ideal for mobile phones, LCD and OLED screens, digital audio equipment, reference voltage sources, digital home appliances, and various portable equipment powered from 1-3 cell alkaline or 1-cell lithium-ion batteries. Some example base part numbers include IXD2110/11, IXD2140, IXD2135/36, and IXD2120/21/22; IXYS customers can choose from a number of product series/options.

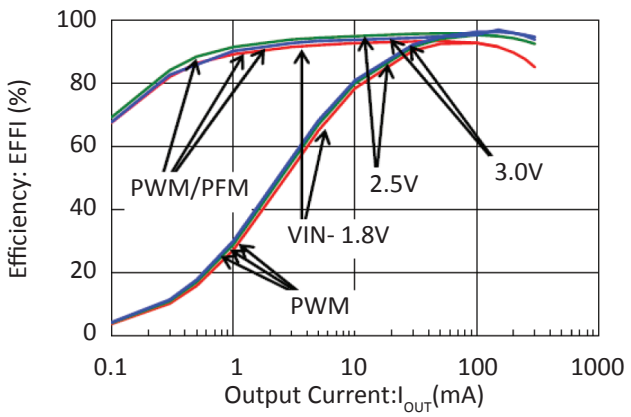
Available compact packages: SOT-23 (2.8mm x 2.9mm x 1.3mm), SOT-25 (2.8mm x 2.9mm x 1.3mm), SOT-89 (4mm x 4.5mm x 1.5mm), USP-6C (1.8mm x 2.0mm x 0.6mm), USP-6EL (1.8mm x 2.0mm x 0.4mm), and USP-10B (2.6mm x 2.9mm x 0.6mm).

IXD2135 Features

- Input voltage range: 0.65V-6.5V
- Output voltage range: 1.8V-5V (0.1V increments)
- Integrated on-chip 0.2Ω N- and P-Channel MOSFETs
- Output voltage accuracy: ±2%
- Switching frequency: 1.2MHz ± 15%
- PWM/PFM mode auto selection
- Under voltage lockout (UVLO) and soft start
- Overcurrent limit and thermal shutdown
- Package: USP-10B



IXD2135 schematic



Part Number	Accuracy, %	Current Consumption, µA	Input Voltage Range, V	Output Voltage Range, V	Switching Frequency, kHz	Additional Features
IXD2110/11	±2.5	2.0	0.9 – 10.0	1.5 – 7.0	100/180	Built-in or external switching transistor
IXD2140	± 2.0	6.3	0.9 – 5.5	1.8 – 5.0	PFM	High speed transient response, synchronous rectification, load disconnect or bypass mode, built-in switching transistors
IXD2135/36	± 2.0	39	0.65 – 6.5	1.8 – 5.0	1200	PWM/PFM mode auto selection, synchronous rectification, load disconnect with output capacitor discharge, built-in switching transistors
IXD2120/21/22	± 2.0	25	1.8 – 6.0	1.5 - 30	100	PWM/PFM mode auto or manual selection, external switching transistor
IXD2141/42	± 2.0	263	0.65 – 6.0	1.8 – 5.5	1.2/3.0	PWM or Auto PWM/PFM, Soft start, Load Disconnection function, CL Auto Discharge Function, Bypass Swtich Function

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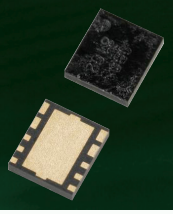
DC/DC Built-in Inductor



Featuring an inductor and a control IC in a tiny package, these synchronous step-down DC/DC converters are well-suited for use in mobile phones, bluetooth headsets, digital home appliances, office automation equipment, and portable equipment. A stable power supply with an output current of 600 mA requires only two capacitors connected externally.

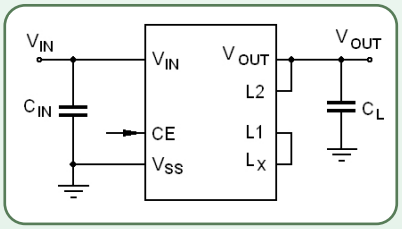
Automatic PWM/PFM switching allows for a fast response to load changes, low ripple noise, and high efficiency over the full range of loads. The CE pin enables placing of the device into stand-by mode with a current consumption below 1.0 µA. A built-in Under Voltage Lockout (UVLO) function forces the internal switching transistor OFF when input voltage goes below a defined threshold.

The high-speed Load Capacitor Discharge function allows for fast CL discharge through a switch located between the LX and VSS pins. Because of this function, when the devices enter stand-by mode, output voltage quickly returns to the VSS level.

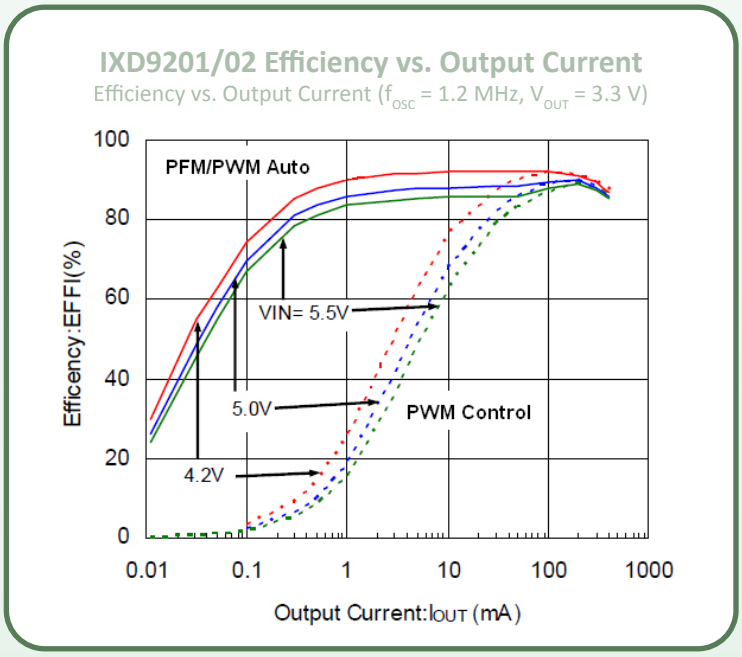
These devices are available in small packages, including CL-2025 (2.5 mm x 2.0 mm x 1.0 mm), USP-10B03 (2.5 mm x 2.15 mm x 1.0 mm), and USP-9B01 (2.5 mm x 3.2 mm x 1.0 mm).

IXD9201/02 Features

- Output Voltage Range: 0.8 V ~ 4.0 V
- Output Voltage Error: ±2%
- Output Current: 600 mA
- High Efficiency: 92% (VIN = 4.2 V, VOUT = 3.3V)
- Oscillation Frequency: 1.2 MHz
- Maximum Duty Cycle: 100%
- Operating Ambient temperature: -40 ~ +85°C
- Package Size: 2.5 x 2.0 x 1.0 mm



IXD9201/02 Schematic



Part Number	Accuracy, %	Input Voltage Range, V	Output Voltage Range, V	Output Current, mA	Switching Frequency, MHz	Additional Features
IXD9201/02	±2%	2.0-6.0	0.8-4.0	600	1.2	PWM/PFM automatic switchover control, under-voltage lockout, soft start, high-speed load capacitor discharge
IXD9205/06	±2%	1.8-6.0	0.8-4.0	600	3	PWM/PFM automatic switchover control, under-voltage lockout, soft start, high-speed load capacitor discharge
IXD9208/09	±2%	1.8-6.0	0.8-4.0	400	3	PWM/PFM automatic switchover control, under-voltage lockout, soft start, high-speed load capacitor discharge
IXD9213/14	±2%	2.7-6.6	0.8-3.6	1500	3	PWM/PFM automatic switchover control, under-voltage lockout, soft start, high-speed load capacitor discharge

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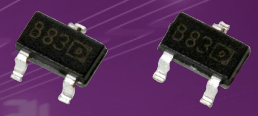
MOSFETs



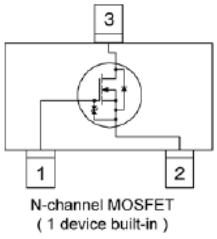
IXDN51A13A0MR-G

The IXDN51A13A0MR-G device is an N-channel Power MOSFET with low on-state resistance and ultra-high speed switching characteristics. Because high-speed switching is possible, the IC can be efficiently set, thereby saving energy. A gate protect diode is built-in to counter static. The small SOT-23 package makes high density mounting possible.

This MOSFET is well-suited for use in applications such as Notebook PCs, cellular and portable phones, on-board power supplies, and lithium-ion battery systems.

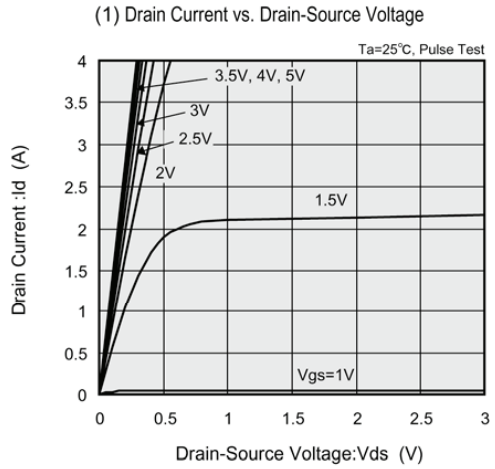
IXDN5 Features

- Low On-State Resistance
- Ultra-High Speed Switching
- Gate Protect Diode Built-in
- Driving Voltage : 1.5V
- N-Channel Power MOSFET
- DMOS Structure
- Small Package : SOT-23
- EU RoHS Compliant, Pb Free



IXDN5 Schematica

IXDN5 Drain Current vs. Drain-Source Voltage

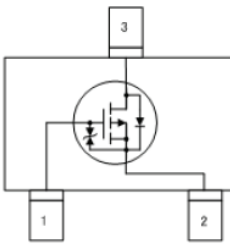


IXDP02A003MR-G

The IXDP02A0003MR-G device is a P-channel 4V (G-S) MOSFET, used in switching applications. It is Halogen- and Antimony-free and fully EU RoHS compliant.

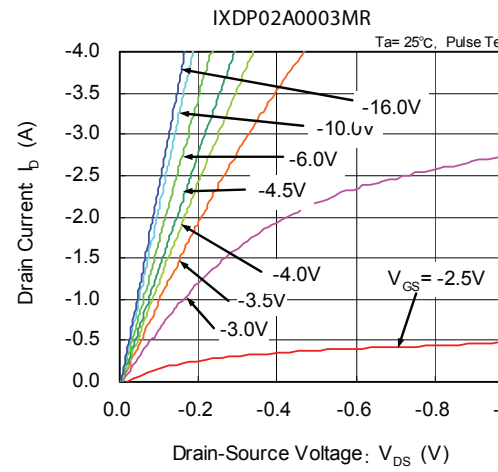
IXDP0 Features

- Low On Resistance
- Ultra-High Speed Switching
- -4V Driving
- EU RoHS Compliant, Pb Free



IXDP0 Schematic

IXDP0 Drain Current vs. Drain-Source Voltage



Part Number	Drain Source Voltage, V	Drain Current(DC), A	Drain Current(Pulse), A	Channel Power Dissipation, W	Drain-Source On-State Resistance, Ω	Additional Features
IXDN51A13AOMR-G	20	1	4	-	0.075Ω @ Vgs = 4.5V 0.10Ω @ Vgs = 2.5V 0.17Ω @ Vgs = 1.5V	Ultra-high speed switching, built-in gate protect diode, small package: SOT-23
IXDP02A0003MR-G	-30	-3	-12	1	0.045Ω @ Vgs = 10V 0.067Ω @ Vgs = 4.5V 0.076Ω @ Vgs = 4V	Ultra-high speed switching, small package: SOT-23