

FDMS4D0N12C

Power MOSFET

120 V, 4.0 mΩ, 118 A, Single N-Channel, PQFN56



ON Semiconductor®

www.onsemi.com

Features

- Small Footprint (5x6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These are Pb-free, Halogen Free / BFR Free and are RoHS Compliant

Typical Applications

- Synchronous Rectification
- AC-DC and DC-DC Power Supplies
- AC-DC Adapters (USB PD) SR
- Load Switch

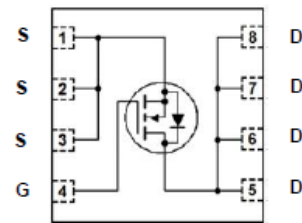
MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, Unless otherwise specified)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	120	V
Gate-to-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current $R_{\theta JC}$ (Note 7)	Steady State	$T_C = 25^\circ\text{C}$	I_D	114	A
			P_D	106	W
Continuous Drain Current $R_{\theta JA}$ (Note 6, 7)	Steady State	$T_A = 25^\circ\text{C}$	I_D	18.5	A
			P_D	2.7	W
Pulsed Drain Current	$T_A = 25^\circ\text{C}$, $t_p = 10 \mu\text{s}$		I_{DM}	628	A
Operating Junction and Storage Temperature			T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Source Current (Body Diode)			I_S	114	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{AV} = 66.7 \text{ A}$, $L = 0.1 \text{ mH}$)			E_{AS}	222	mJ
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)			T_L	300	$^\circ\text{C}$

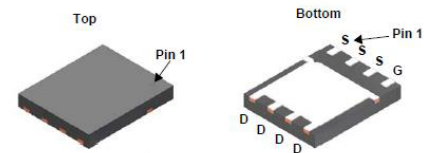
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

$V_{(BR)DSS}$	$I_D \text{ MAX}$	$R_{DS(on)} \text{ MAX}$
120 V	67 A	4.0 mΩ @ 10 V
	33 A	8.0 mΩ @ 6 V

ELECTRICAL CONNECTION

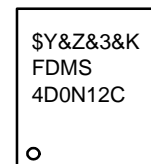


N-Channel MOSFET



Power 56
(PQFN8 5x6)
CASE 483AF

MARKING DIAGRAM



\$Y = ON Semiconductor Logo
 &Z = Assembly Plant Code
 &3 = Numeric Date Code
 &K = Lot Code
 FDMS4D0N12C = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDMS4D0N12C

ORDERING INFORMATION

Device	Package	Shipping†
FDMS4D0N12C	PQFN8 (Power 56) (Pb-Free)	3,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction – to – Case – Steady State (Note 7)	$R_{\theta JC}$	1.18	°C/W
Junction – to – Ambient – Steady State (Note 7)	$R_{\theta JA}$	45	

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Symbol Test Conditions	Min	Typ	Max	Unit
--------	-----------	---------------------------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain – to – Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	120			V
Drain – to – Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\ \mu\text{A}$, ref to 25°C		49		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V},$ $V_{DS} = 96\text{ V}$	$T_J = 25^\circ\text{C}$		1	μA
			$T_J = 125^\circ\text{C}$		100	μA
Gate – to – Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 8)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 370\text{ A}$	2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	$I_D = 250\ \mu\text{A}$, ref to 25°C		-8.5		mV/°C
Drain – to – Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 67\text{ A}$		3.3	4.0	m Ω
		$V_{GS} = 6\text{ V}, I_D = 33\text{ A}$		4.7	8.0	
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{ V}, I_D = 67\text{ A}$		144		S
Gate-Resistance	R_G	$T_A = 25^\circ\text{C}$		0.9	1.8	Ω

CHARGES & CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz},$ $V_{DS} = 60\text{ V}$		4565	6460	pF	
Output Capacitance	C_{OSS}			2045	3060		
Reverse Transfer Capacitance	C_{RSS}			17	24		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 6\text{ V}, V_{DS} = 60\text{ V},$ $I_D = 67\text{ A}$		36	51	nC	
Total Gate Charge	$Q_{G(TOT)}$		$V_{GS} = 10\text{ V}, V_{DS} = 60\text{ V},$ $I_D = 67\text{ A}$		58		82
Gate-to-Source Charge	Q_{GS}				21		
Gate-to-Drain Charge	Q_{GD}				9		
Plateau Voltage	V_{GP}			5		V	
Output Charge	Q_{OSS}	$V_{DD} = 60\text{ V}, V_{GS} = 0\text{ V}$		207		nC	

FDMS4D0N12C

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Symbol Test Conditions	Min	Typ	Max	Unit
--------	-----------	---------------------------	-----	-----	-----	------

SWITCHING CHARACTERISTICS (Note 8)

Turn – On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 60\text{ V},$ $I_D = 67\text{ A}, R_G = 6\ \Omega$		25	41	ns
Rise Time	t_r			8	16	
Turn – Off Delay Time	$t_{d(OFF)}$			45	72	
Fall Time	t_f			12	22	

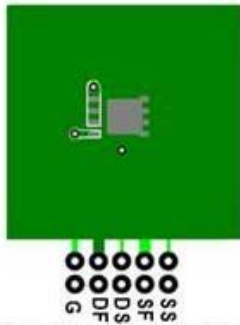
DRAIN–SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V},$ $I_S = 67\text{ A}$	$T_J = 25^\circ\text{C}$		0.86	1.3	V
			$T_J = 125^\circ\text{C}$		0.7	1.2	
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V},$ $di_S/dt = 300\text{ A}/\mu\text{s},$ $I_S = 33\text{ A}$			53	84	ns
Reverse Recovery Charge	Q_{RR}				175	280	nC
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V},$ $di_S/dt = 1000\text{ A}/\mu\text{s},$ $I_S = 33\text{ A}$			36	57	ns
Reverse Recovery Charge	Q_{RR}				360	575	nC

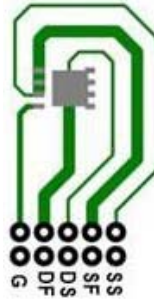
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR–4 material. $R_{\theta CA}$ is determined by the user's board design.



- a) 45°C/W when mounted on a 1 in² pad of 2 oz copper.



- b) 115°C/W when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.
- E_{AS} of 222 mJ is based on starting $T_J = 25^\circ\text{C}$; $L = 0.1\text{ mH}$, $I_{AS} = 66.7\text{ A}$, $V_{DD} = 100\text{ V}$, $V_{GS} = 12\text{ V}$, 100% tested at $L = 0.1\text{ mH}$, $I_{AS} = 66.7\text{ A}$.
- Pulsed I_D please refer to Fig. 11 SOA graph for more details.
- Computed continuous current limited to max Junction Temperature only, actual continuous current will be limited by thermal & electro–mechanical application board design.
- Surface–mounted on FR4 board using 1 in² pad size, 2 oz Cu pad.
- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- Switching characteristics are independent of operating junction temperatures.

FDMS4D0N12C

TYPICAL CHARACTERISTICS

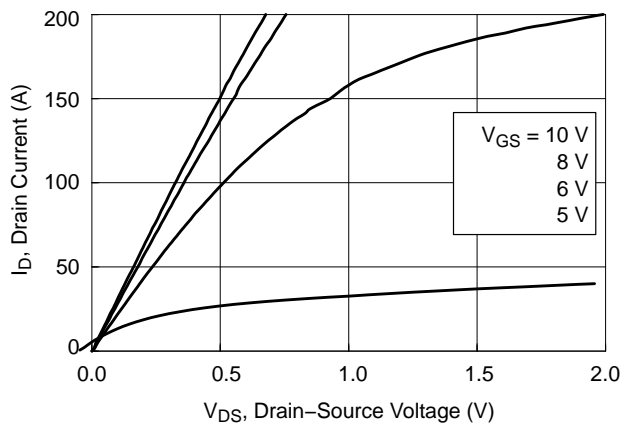


Figure 1. On-Region Characteristics

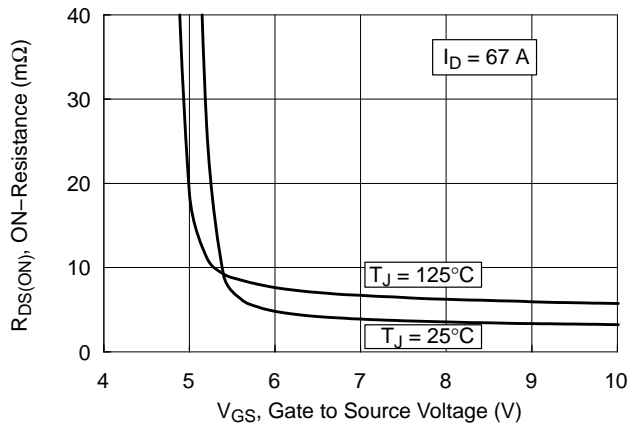


Figure 2. Transfer Characteristics

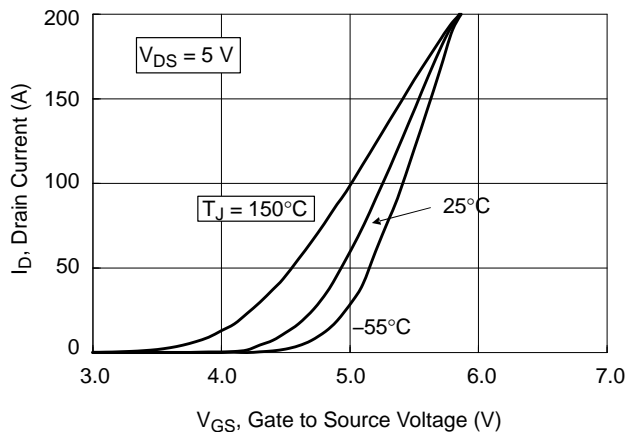


Figure 3. On-Resistance vs. Gate-to-Source Voltage

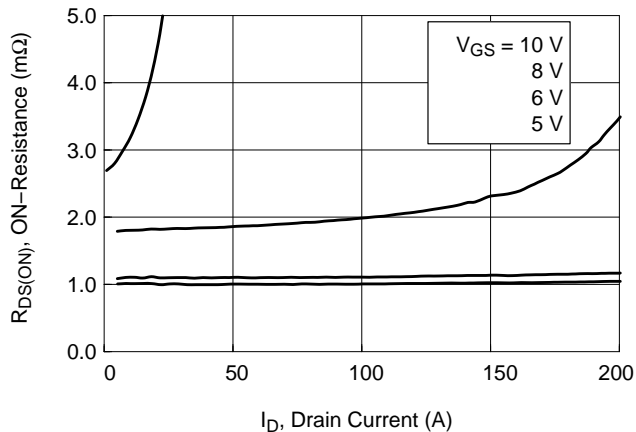


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

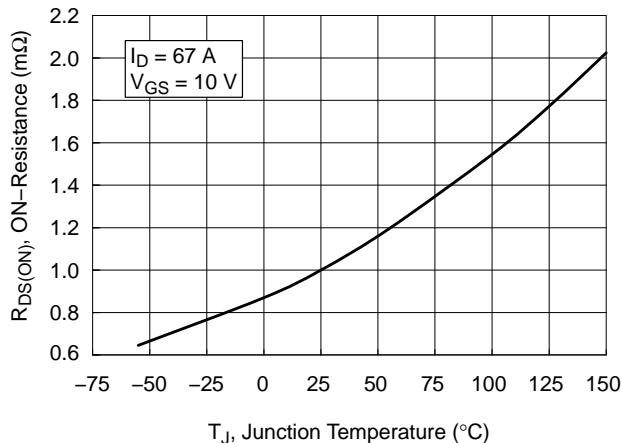


Figure 5. On-Resistance Variation with Temperature

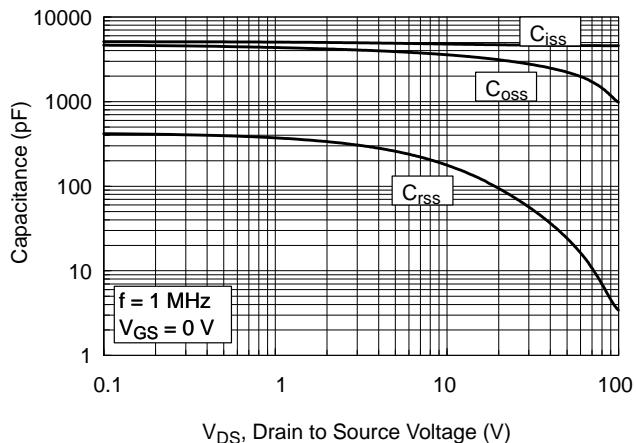


Figure 6. Capacitance Variation

FDMS4D0N12C

TYPICAL CHARACTERISTICS (continued)

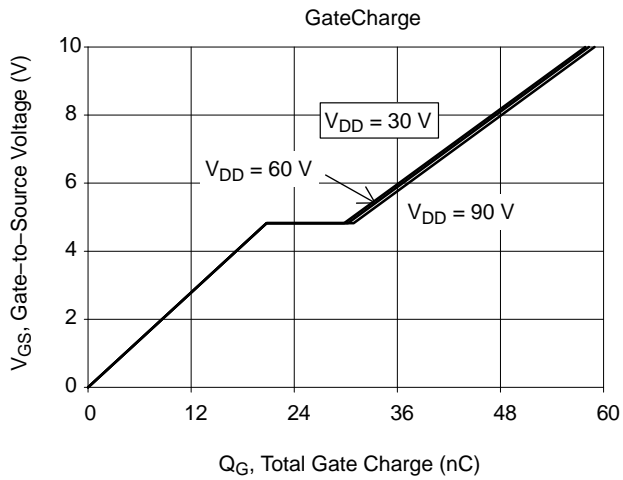


Figure 7. Gate-to-Source Voltage vs. Total Charge

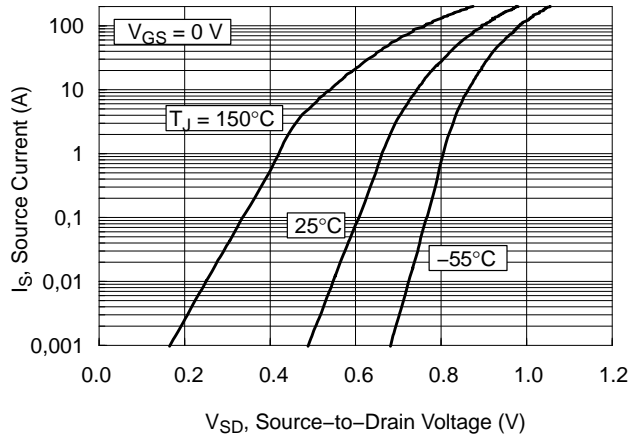


Figure 8. Diode Forward Voltage vs. Current

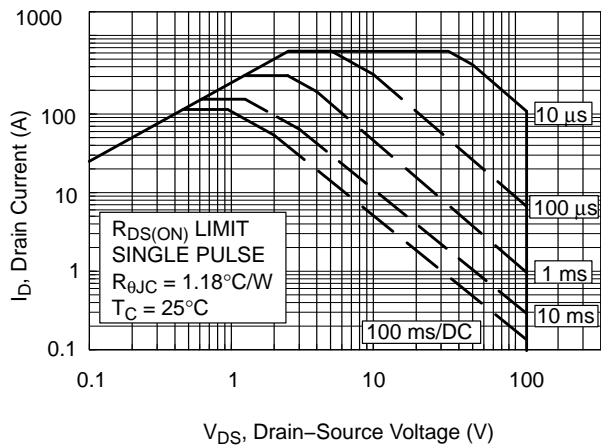


Figure 9. Safe Operating Area

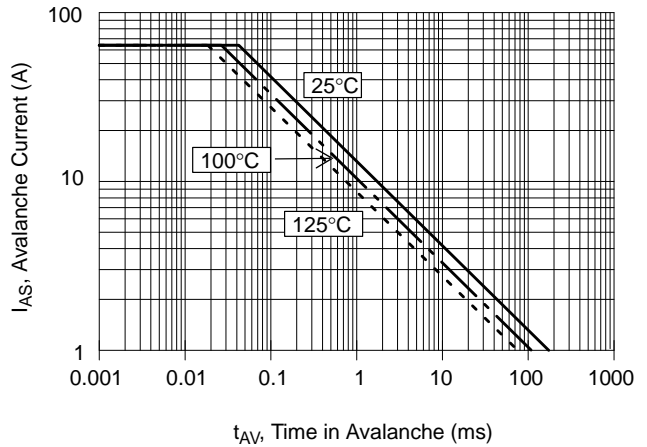
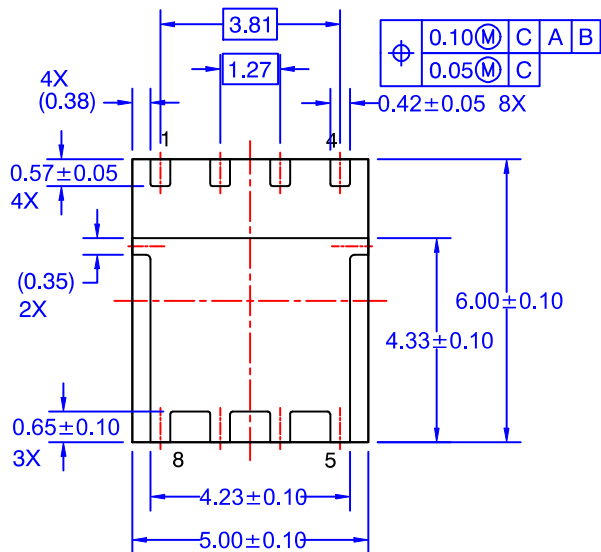
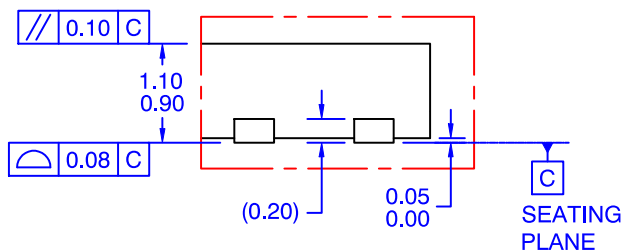
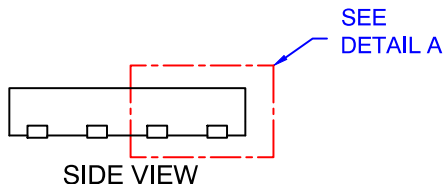
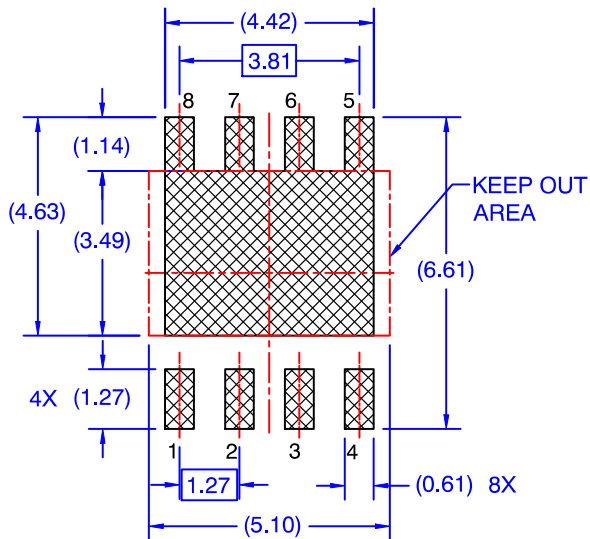
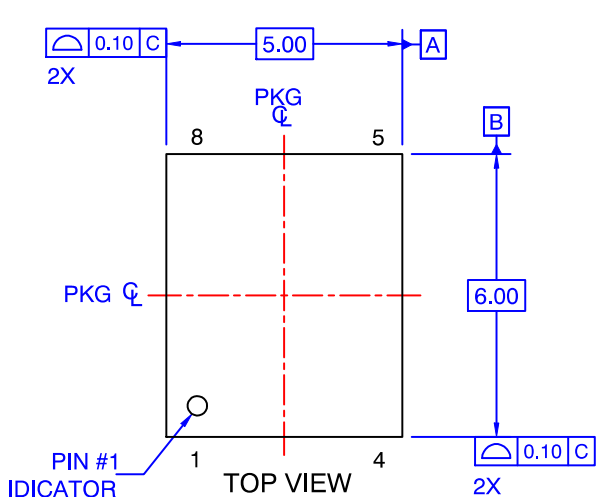


Figure 10. I_{PEAK} vs. Time in Avalanche

FDMS4D0N12C


PACKAGE DIMENSIONS

PQFN8 5X6, 1.27P
CASE 483AF
ISSUE O



SCALE: 2:1

- NOTES: UNLESS OTHERWISE SPECIFIED
- A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. AA,
 - B) ALL DIMENSIONS ARE IN MILLIMETERS.
 - C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
 - D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
 - E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.