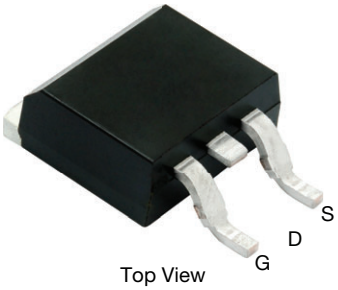
N-Channel 40 V (D-S) MOSFET

TO-263



Top View

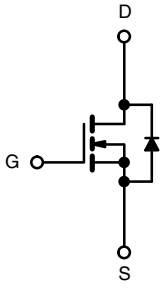
FEATURES

- TrenchFET® power MOSFET
- Maximum 175 °C junction temperature
- Excellent R_{DS}-Q_g and R_{DS}-Q_{oss} FOM reduce power loss from conduction and switching to enable high efficiency
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- Battery management



N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.00167
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.00224
Q_g typ. (nC)	130
I_D (A)	150 [d]
Configuration	Single

ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free and halogen-free	SUM40012EL-GE3

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	40	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 150 °C)	T_C = 25 °C	I_D	150 [d]	A
	T_C = 70 °C		150 [d]	
Pulsed drain current (t = 100 µs)		I_{DM}	300	
Avalanche current		I_{AS}	50	
Single avalanche energy [a]	L = 0.1 mH	E_{AS}	125	mJ
Maximum power dissipation [a]	T_C = 25 °C	P_D	150 [b]	W
	T_C = 125 °C		50 [b]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient (PCB mount) [c]	R_{thJA}	40	°C/W
Junction-to-case (drain)	R_{thJC}	1	

Notes

a. Duty cycle ≤ 1 %
b. See SOA curve for voltage derating
c. When mounted on 1" square PCB (FR4 material)
d. Package limited

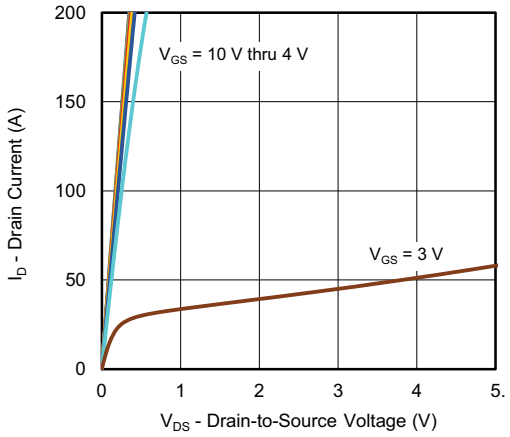
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1	-	2.5	
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 250	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 175 °C	-	-	5	mA
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 10 V	120	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.00139	0.00167	Ω
		V_{GS} = 4.5 V, I_D = 20 A	-	0.00186	0.00224	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	230	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz	-	10 930	-	pF
Output capacitance	C_{oss}		-	2041	-	
Reverse transfer capacitance	C_{rss}		-	101	-	
Total gate charge [c]	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 20 A	-	130	195	nC
Gate-source charge [c]	Q_{gs}		-	33.6	-	
Gate-drain charge [c]	Q_{gd}		-	6.7	-	
Output charge	Q_{oss}	V_{DS} = 20 V, V_{GS} = 0 V	-	64	96	
Gate resistance	R_g	f = 1 MHz	0.36	1.8	3.6	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 20 V, R_L = 2 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	25	50	ns
Rise time [c]	t_r		-	12	24	
Turn-off delay time [c]	$t_{d(off)}$		-	65	130	
Fall time [c]	t_f		-	18	36	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed current (t = 100 µs)	I_{SM}		-	-	300	A
Forward voltage [a]	V_{SD}	I_F = 10 A, V_{GS} = 0 V	-	0.8	1.5	V
Reverse recovery time	t_{rr}	I_F = 10 A, di/dt = 100 A/µs	-	58	116	ns
Peak reverse recovery charge	$I_{RM(REC)}$		-	2.1	4.2	A
Reverse recovery charge	Q_{rr}		-	72	144	nC
Reverse recovery fall time	t_a		-	32	-	ns
Reverse recovery rise time	t_b		-	26	-	

Notes

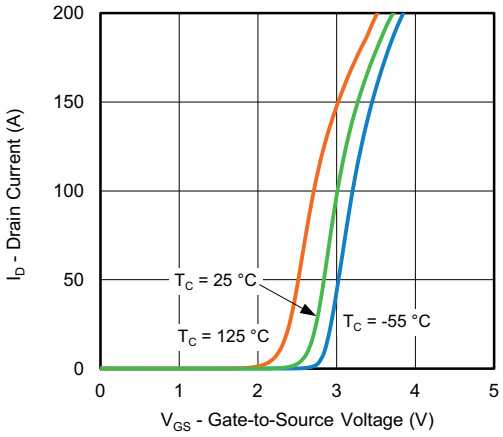
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

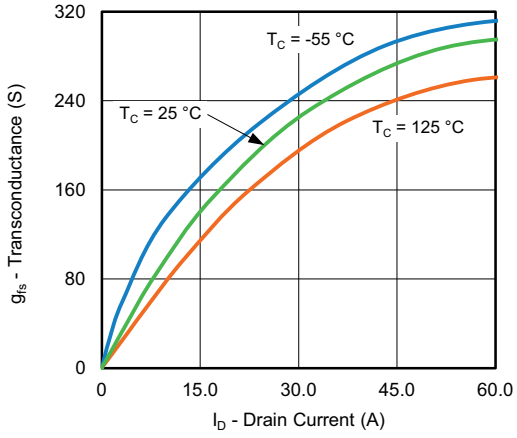
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



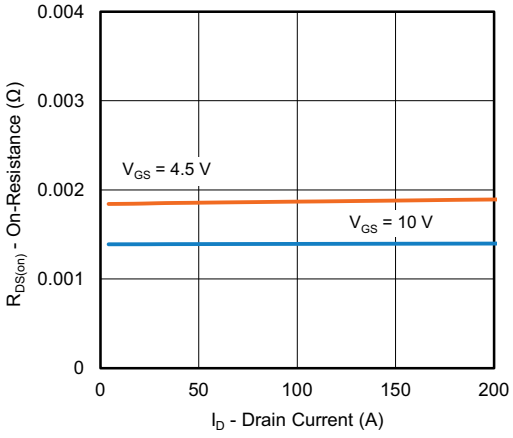
Output Characteristics



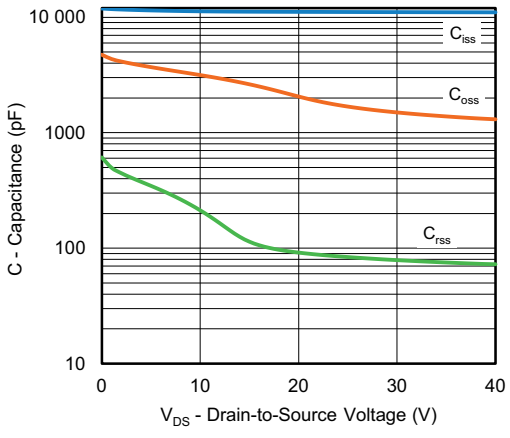
Transfer Characteristics



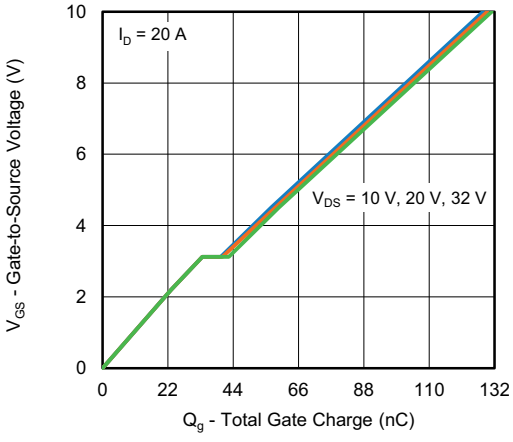
Transconductance



On-Resistance vs. Drain Current

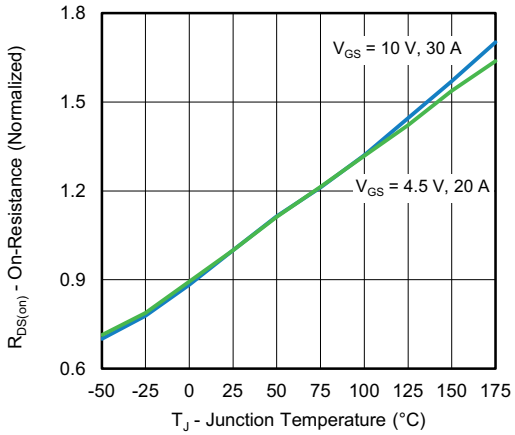


Capacitance

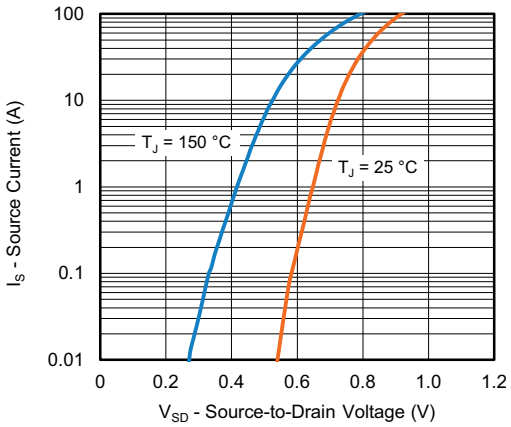


Gate Charge

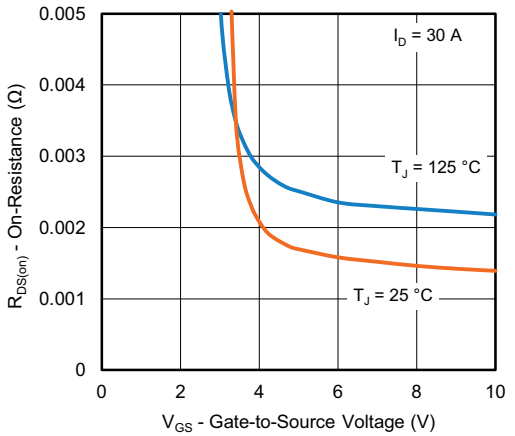
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



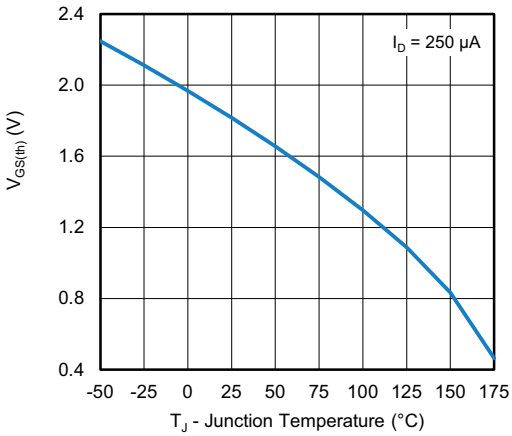
On-Resistance vs. Junction Temperature



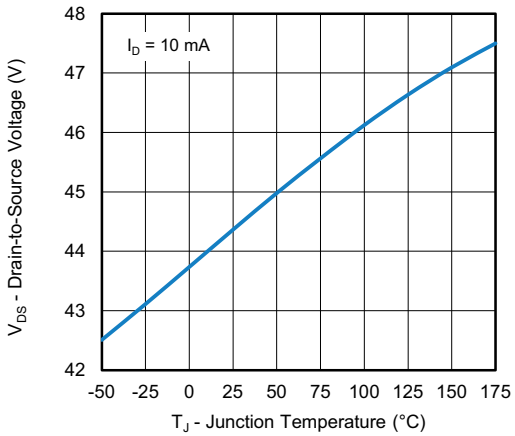
Source Drain Diode Forward Voltage



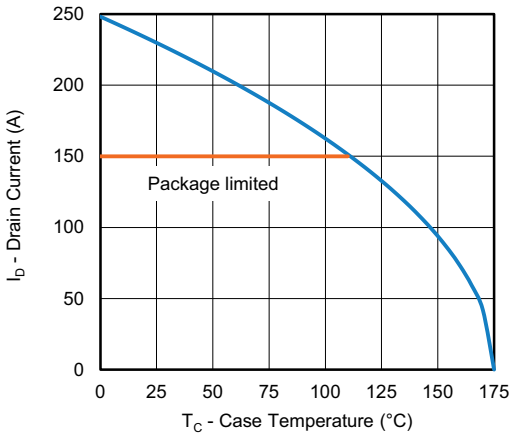
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

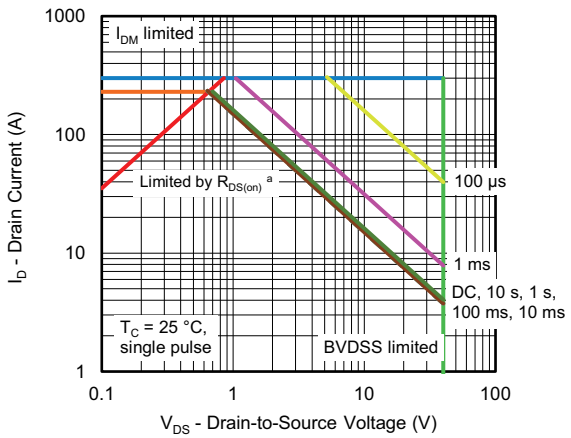


Drain Source Breakdown vs. Junction Temperature

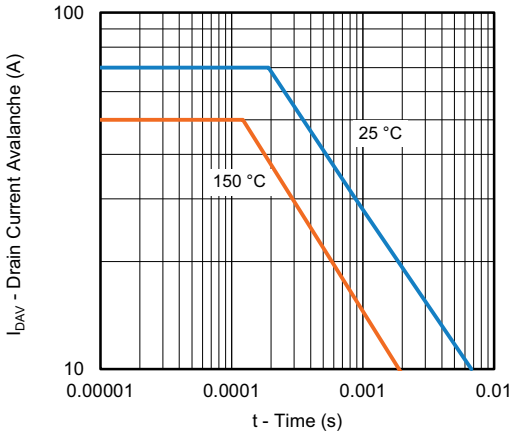


Current De-rating

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



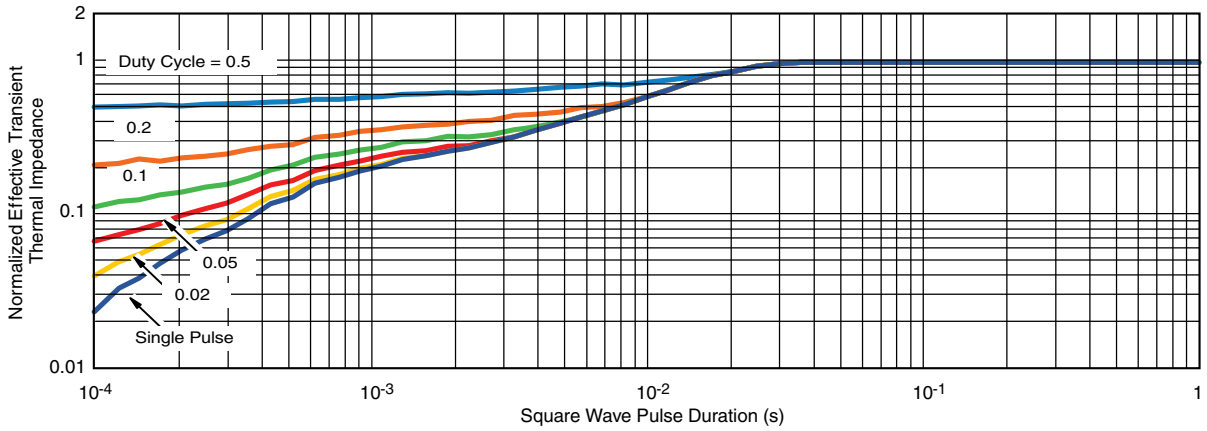
Safe Operating Area



Single Pulse Avalanche Current Capability vs. Time

Note

a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction to Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction to Case (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual pplication parameters and operating conditions

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?79643.

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

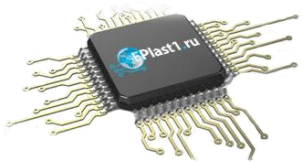
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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.