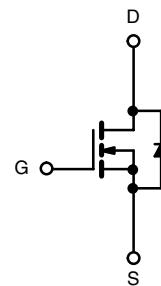
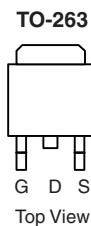


## N-Channel 100-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.024 at $V_{GS} = 10$ V	47
	0.027 at $V_{GS} = 4.5$ V	44

### FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- 100 %  $R_g$  Tested



Ordering Information: SUM47N10-24L-E3 (Lead (Pb)-free)

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C) <sup>b</sup>	$I_D$	47	A
		27	
Pulsed Drain Current	$I_{DM}$	70	
Continuous Source Current (Diode Conduction)	$I_S$	47	
Single Pulse Avalanche Current	$I_{AS}$	40	
Single Pulse Avalanche Energy (Duty Cycle $\leq 1$ %)	$E_{AS}$	80	mJ
Maximum Power Dissipation	$P_D$	136 <sup>b</sup>	W
		3.75 <sup>a</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Unit
Junction-to-Ambient	$R_{thJA}$	40	°C/W
Free Air		62.5	
Junction-to-Case	$R_{thJC}$	1.1	

Notes:

a. Surface Mounted on 1" x 1" FR4 Board.

b. See SOA curve for voltage derating.

**SPECIFICATIONS**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	100			V
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}$ , $I_D = 250 \mu\text{A}$	1.0		3.0	
Gate-Body Leakage	$I_{\text{GSS}}$	$V_{\text{DS}} = 0 \text{ V}$ , $V_{\text{GS}} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}} = 100 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$		1		$\mu\text{A}$
		$V_{\text{DS}} = 100 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$		50		
		$V_{\text{DS}} = 100 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$ , $T_J = 175^\circ\text{C}$		250		
On-State Drain Current <sup>b</sup>	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} = 5 \text{ V}$ , $V_{\text{GS}} = 10 \text{ V}$	70			A
Drain-Source On-State Resistance <sup>b</sup>	$r_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}$ , $I_D = 40 \text{ A}$		0.019	0.024	$\Omega$
		$V_{\text{GS}} = 10 \text{ V}$ , $I_D = 40 \text{ A}$ , $T_J = 125^\circ\text{C}$			0.048	
		$V_{\text{GS}} = 10 \text{ V}$ , $I_D = 40 \text{ A}$ , $T_J = 175^\circ\text{C}$			0.060	
		$V_{\text{GS}} = 4.5 \text{ V}$ , $I_D = 20 \text{ A}$		0.021	0.027	
Forward Transconductance <sup>b</sup>	$g_{\text{fs}}$	$V_{\text{DS}} = 15 \text{ V}$ , $I_D = 40 \text{ A}$		70		S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{GS}} = 0 \text{ V}$ , $V_{\text{DS}} = 25 \text{ V}$ , $f = 1 \text{ MHz}$		2400		$\text{pF}$
Output Capacitance	$C_{\text{oss}}$			290		
Reverse Transfer Capacitance	$C_{\text{rss}}$			120		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{\text{DS}} = 50 \text{ V}$ , $V_{\text{GS}} = 10 \text{ V}$ , $I_D = 40 \text{ A}$		40	60	$\text{nC}$
Gate-Source Charge <sup>c</sup>	$Q_{\text{gs}}$			11		
Gate-Drain Charge <sup>c</sup>	$Q_{\text{gd}}$			9		
Gate Resistance	$R_g$	$f = 1 \text{ MHz}$	1	2.2	3.5	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 50 \text{ V}$ , $R_L = 1.25 \Omega$ $I_D \geq 47 \text{ A}$ , $V_{\text{GEN}} = 10 \text{ V}$ , $R_g = 2.5 \Omega$		8	13	$\text{ns}$
Rise Time <sup>c</sup>	$t_r$			40	60	
Turn-Off Delay Time <sup>c</sup>	$t_{\text{d}(\text{off})}$			15	25	
Fall Time <sup>c</sup>	$t_f$			80	120	
<b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25^\circ\text{C}$						
Pulsed Current	$I_{\text{SM}}$				70	A
Diode Forward Voltage <sup>b</sup>	$V_{\text{SD}}$	$I_F = 40 \text{ A}$ , $V_{\text{GS}} = 0 \text{ V}$		1.0	1.5	V
Source-Drain Reverse Recovery Time	$t_{\text{rr}}$	$I_F = 47 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$		75	120	ns

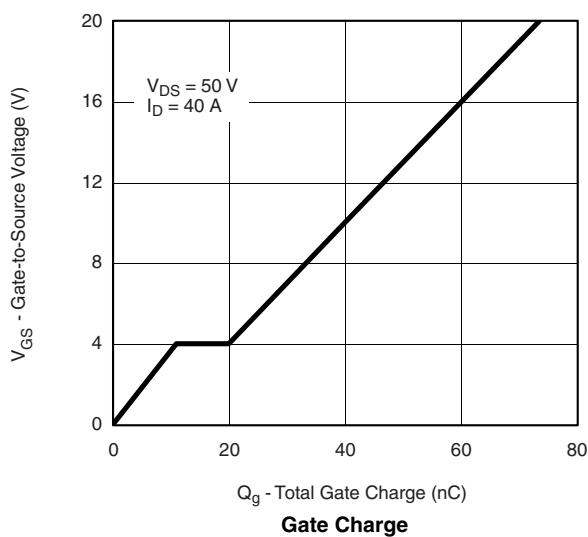
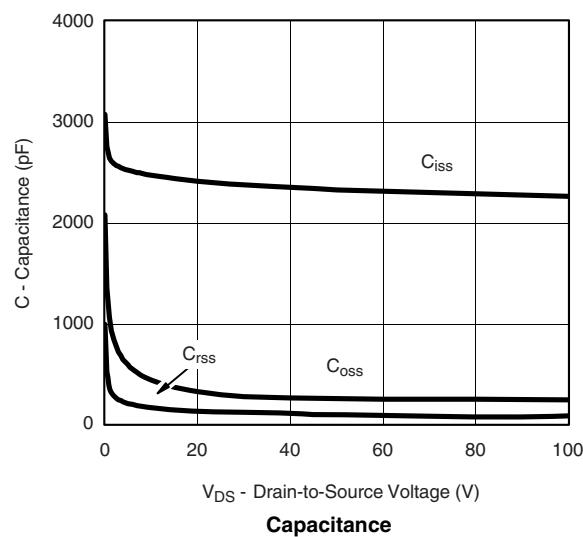
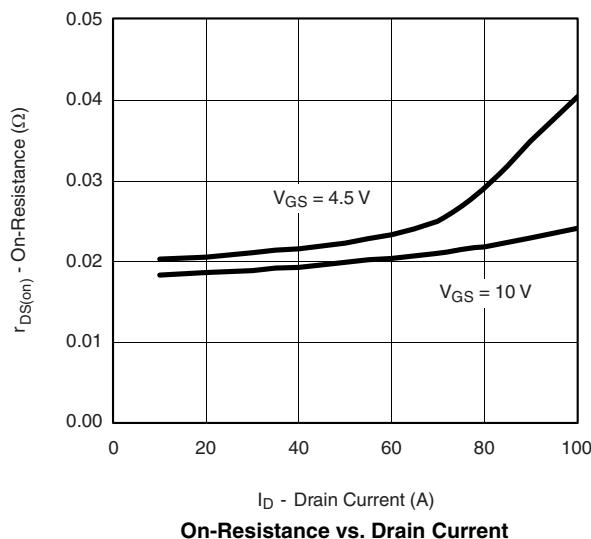
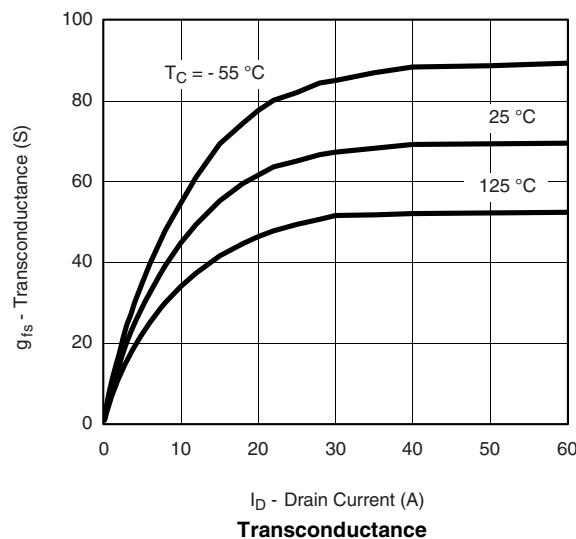
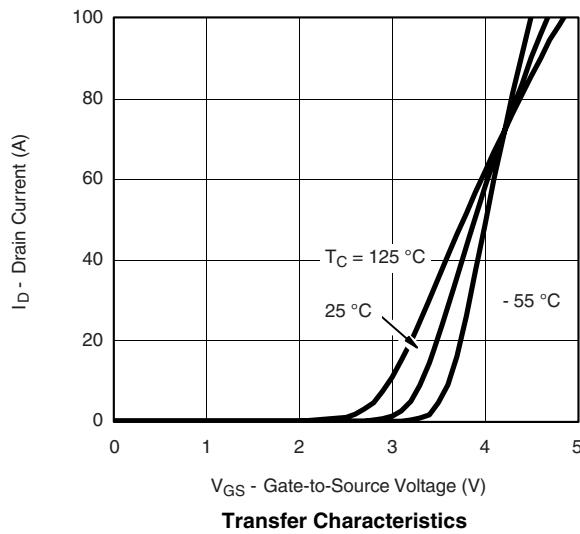
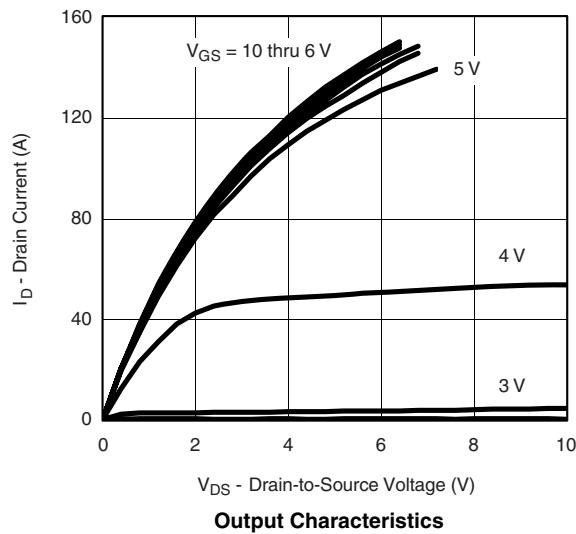
## Notes:

a. Guaranteed by design, not subject to production testing.

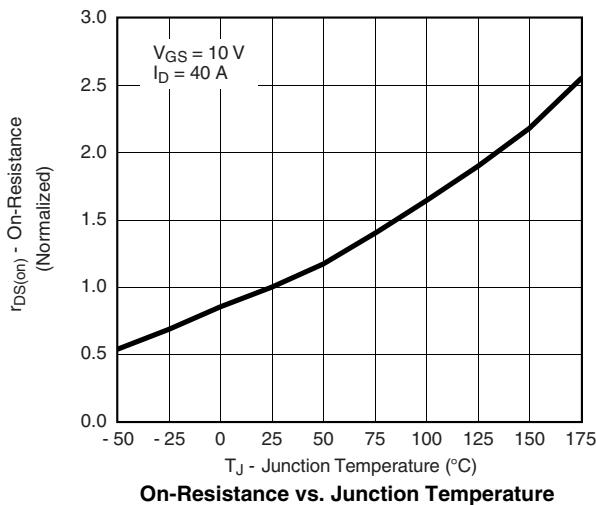
b. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

c. Independent of operating temperature.

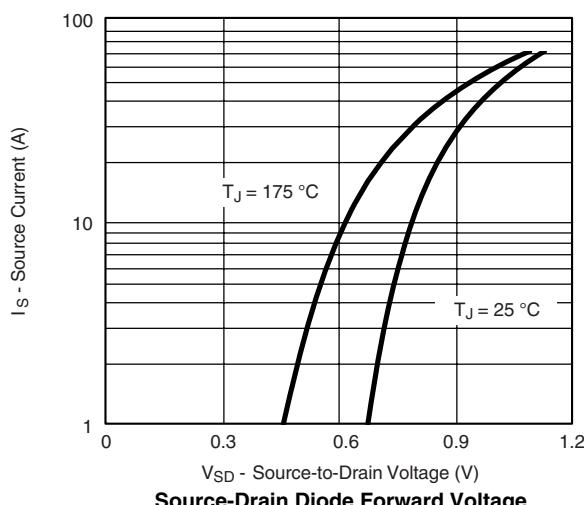
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

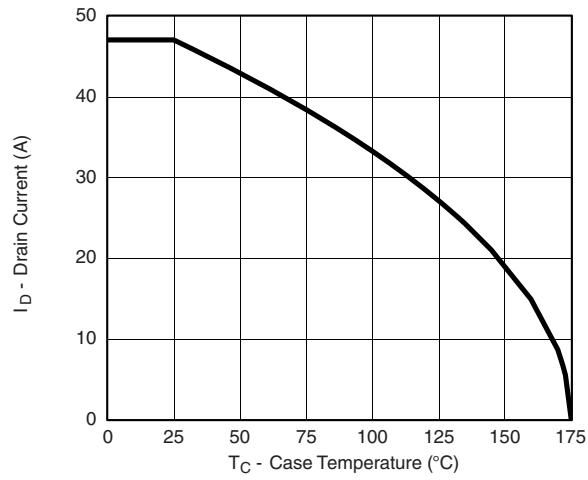


On-Resistance vs. Junction Temperature

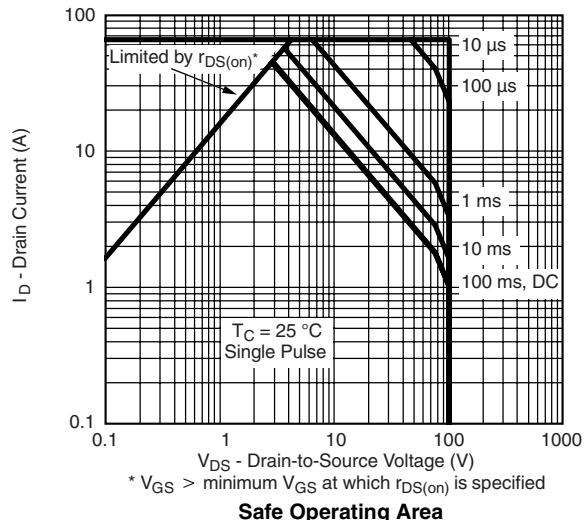


Source-Drain Diode Forward Voltage

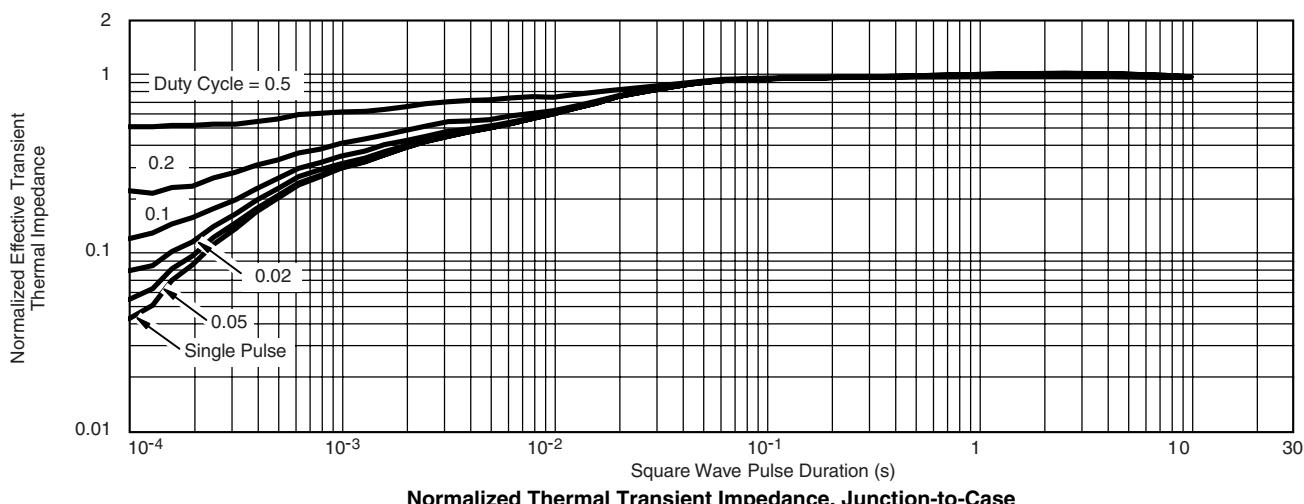
### THERMAL RATINGS



Maximum Avalanche Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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 <http://www.vishay.com/ppg?72827>.

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