RoHS

COMPLIANT

HALOGEN

FREE



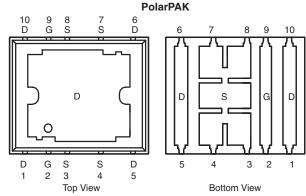


## N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY						
		I <sub>D</sub> (A)				
V <sub>DS</sub> (V)	$R_{DS(on)}\left(\Omega\right)$	Silicon Limit	Package Limit	Q <sub>g</sub> (Typ.)		
100	$0.0142 \text{ at V}_{GS} = 10 \text{ V}$	64	60 <sup>a</sup>	50 nC		

#### Package Drawing

www.vishay.com/doc?72945



Top surface is connected to pins 1, 5, 6, and 10

Ordering Information: SiE854DF-T1-E3 (Lead (Pb)-free)

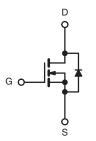
SiE854DF-T1-GE3 (Lead (Pb)-free and Halogen-free)

## **FEATURES**

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- Ultra Low Thermal Resistance Using Top-Exposed PolarPAK<sup>®</sup> Package for Double-Sided Cooling
- Leadframe-Based New Encapsulated Package
  - Die Not Exposed
  - Same Layout Regardless of Die Size
- Low Q<sub>gd</sub>/Q<sub>gs</sub> Ratio Helps Prevent Shoot-Through
- 100 % R<sub>q</sub> and UIS Tested
- Compliant to RoHS directive 2002/95/EC

## **APPLICATIONS**

- Primary Side Switch
- · Half-Bridge



N-Channel MOSFET For Related Documents www.vishay.com/ppg?69824

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		$V_{DS}$	100	V	
Gate-Source Voltage		$V_{GS}$	± 20		
	T <sub>C</sub> = 25 °C		64 (Silicon Limit)		
	10 - 25 0		60 <sup>a</sup> (Package Limit)		
Continuous Drain Current ( $T_J = 150  ^{\circ}C$ )	T <sub>C</sub> = 70 °C	I <sub>D</sub>	52		
	T <sub>A</sub> = 25 °C		13.2 <sup>b, c</sup>		
	T <sub>A</sub> = 70 °C		10.5 <sup>b, c</sup>	A	
Pulsed Drain Current		I <sub>DM</sub>	60		
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C		60 <sup>a</sup>		
Continuous Source-Diam Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	4.3 <sup>b, c</sup>		
Single Pulse Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	40		
Single Pulse Avalanche Energy		E <sub>AS</sub>	80	mJ	
	T <sub>C</sub> = 25 °C		125		
Maximum Power Dissipation	T <sub>C</sub> = 70 °C	P <sub>D</sub>	80	W	
	T <sub>A</sub> = 25 °C	' D	5.2 <sup>b, c</sup>	VV	
	T <sub>A</sub> = 70 °C		3.3 <sup>b, c</sup>		
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C	
Soldering Recommendations (Peak Temperature) <sup>d, e</sup>			260		

#### Notes:

- a. Package limited.
- b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 10 s.
- d. See Solder Profile (<u>www.vishay.com/doc?73257</u>). The PolarPAK is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

## SiE854DF

## Vishay Siliconix



THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
		$R_{thJA}$	20	24		
Maximum Junction-to-Case (Drain Top)	Steady State	R <sub>thJC</sub> (Drain)	0.8	1	°C/W	
Maximum Junction-to-Case (Source) <sup>a, c</sup>	aximum Junction-to-Case (Source) <sup>a, c</sup>		2.2	2.7		

#### Notes:

- a. Surface Mounted on 1" x 1" FR4 board.
- b. Maximum under Steady State conditions is 68 °C/W.
- c. Measured at source pin (on the side of the package).

Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	$V_{DS}$	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	100			V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I <sub>D</sub> = 250 μA		120		mV/°C	
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 10			
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_{D} = 250 \mu A$	2.5		4.4	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V			1	μΑ	
		$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$			10		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	25			Α	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 10 \text{ V}, I_D = 13.2 \text{ A}$		0.0117	0.0142	Ω	
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 13.2 A		30		S	
Dynamic <sup>b</sup>							
Input Capacitance	C <sub>iss</sub>			3100		pF	
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		250			
Reverse Transfer Capacitance	C <sub>rss</sub>			95			
Total Gate Charge	Qq			50	75	nC	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 50 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 13.2 \text{ A}$		16			
Gate-Drain Charge	$Q_{gd}$			13			
Gate Resistance	$R_{g}$	f = 1 MHz		1	1.5	Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			15	25		
Rise Time	t <sub>r</sub>	$V_{DD} = 50 \text{ V}, R_L = 5 \Omega$		10	15	ns	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong 10 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$		30	45		
Fall Time	t <sub>f</sub>			10	15		
<b>Drain-Source Body Diode Characteristic</b>	s						
Continuous Source-Drain Diode Current	Is	T <sub>C</sub> = 25 °C			60	А	
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				60		
Body Diode Voltage	$V_{SD}$	I <sub>S</sub> = 10 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	-		70	110	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	L = 10 A dl/dt = 100 A/up T 05 °C		195	300	nC	
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = 10 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, T_J = 25 ^{\circ}\text{C}$		56			
Reverse Recovery Rise Time	t <sub>b</sub>	7		14		ns	

#### Notes

- a. Pulse test; pulse width  $\leq$  300  $\mu s,$  duty cycle  $\leq$  2 %
- b. Guaranteed by design, not subject to production testing.

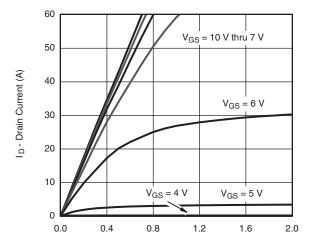
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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





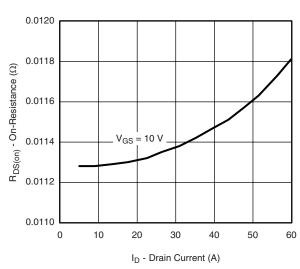


## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

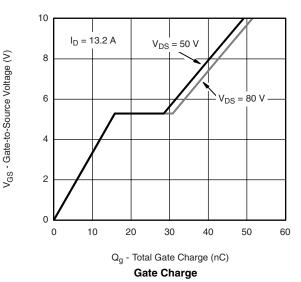


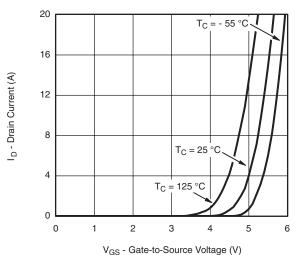
V<sub>DS</sub> - Drain-to-Source Voltage (V)

## **Output Characteristics**



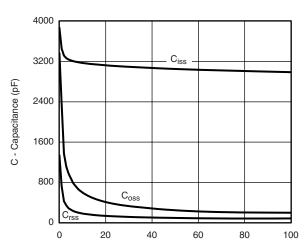
On-Resistance vs. Drain Current and Gate Voltage





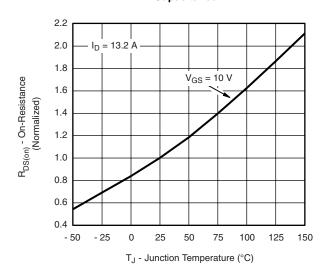
VGS - Gate-to-Source voltage (V)

### **Transfer Characteristics**



V<sub>DS</sub> - Drain-to-Source Voltage (V)

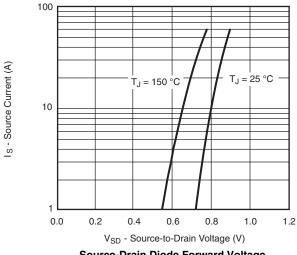
## Capacitance

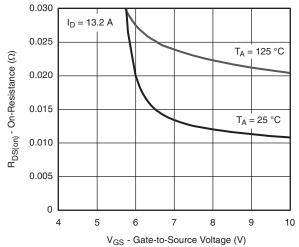


On-Resistance vs. Junction Temperature

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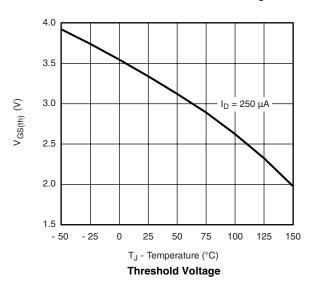
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

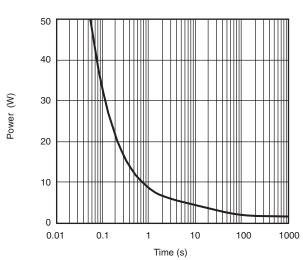




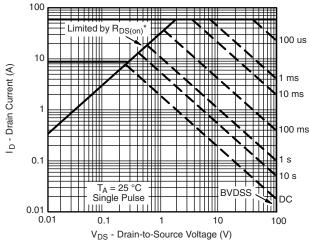
#### Source-Drain Diode Forward Voltage







Single Pulse Power, Junction-to-Ambient



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

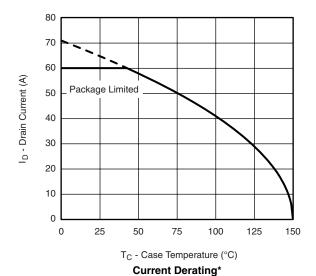
Safe Operating Area, Junction-to-Ambient

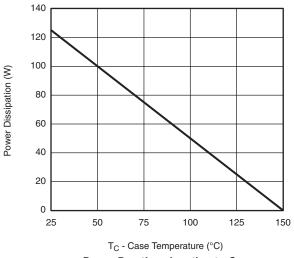




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## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





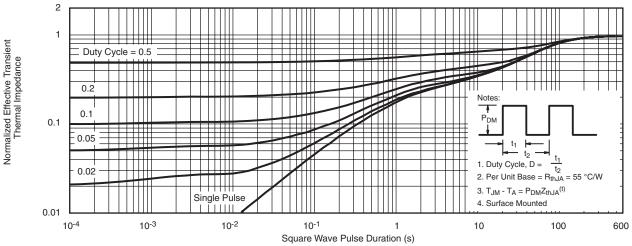
Power Derating, Junction-to-Case

<sup>\*</sup> The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

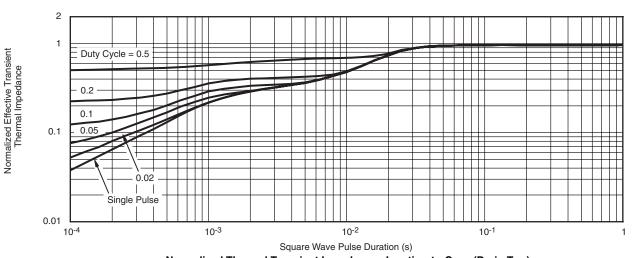
## Vishay Siliconix

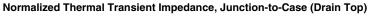
# VISHAY.

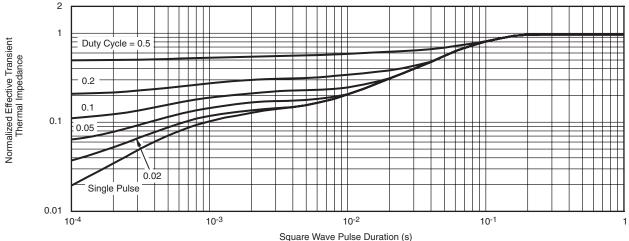
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



## Normalized Thermal Transient Impedance, Junction-to-Ambient







#### Normalized Thermal Transient Impedance, Junction-to-Source

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 <a href="https://www.vishay.com/ppg?69824">www.vishay.com/ppg?69824</a>.



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