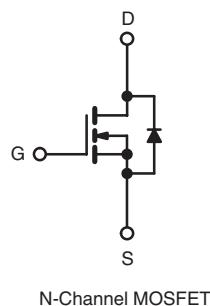
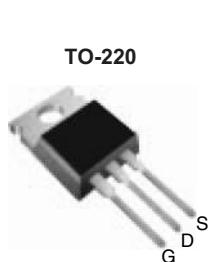


## Power MOSFET

PRODUCT SUMMARY	
V <sub>DS</sub> (V)	500
R <sub>DS(on)</sub> (Ω)	V <sub>GS</sub> = 10 V      0.85
Q <sub>g</sub> (Max.) (nC)	38
Q <sub>gs</sub> (nC)	9.0
Q <sub>gd</sub> (nC)	18
Configuration	Single


**RoHS\***  
COMPLIANT

### FEATURES

- Low Gate Charge Q<sub>g</sub> Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Effective C<sub>oss</sub> Specified
- Lead (Pb)-free Available

### APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptable Power Supply
- High Speed Power Switching

### TYPICAL SMPS TOPOLOGIES

- Two Transistor Forward
- Half Bridge
- Full Bridge

ORDERING INFORMATION	
Package	TO-220
Lead (Pb)-free	IRF840APbF SiHF840A-E3
SnPb	IRF840A SiHF840A

### ABSOLUTE MAXIMUM RATINGS T<sub>C</sub> = 25 °C, unless otherwise noted

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V <sub>DS</sub>	500	V
Gate-Source Voltage	V <sub>GS</sub>	± 30	
Continuous Drain Current	V <sub>GS</sub> at 10 V	T <sub>C</sub> = 25 °C	I <sub>D</sub>
		T <sub>C</sub> = 100 °C	8.0
			5.1
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	32	A
Linear Derating Factor		1.0	W/°C
Single Pulse Avalanche Energy <sup>b</sup>	E <sub>AS</sub>	510	mJ
Repetitive Avalanche Current <sup>a</sup>	I <sub>AR</sub>	8.0	A
Repetitive Avalanche Energy <sup>a</sup>	E <sub>AR</sub>	13	mJ
Maximum Power Dissipation	P <sub>D</sub>	125	W
Peak Diode Recovery dV/dt <sup>c</sup>	dV/dt	5.0	V/ns
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)	for 10 s	300 <sup>d</sup>	
Mounting Torque	6-32 or M3 screw	10	lbf · in
		1.1	N · m

#### Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. V<sub>DD</sub> = 50 V, starting T<sub>J</sub> = 25 °C, L = 16 mH, R<sub>G</sub> = 25 Ω, I<sub>AS</sub> = 8.0 A (see fig. 12).

c. I<sub>SD</sub> ≤ 8.0 A, dI/dt ≤ 100 A/μs, V<sub>DD</sub> ≤ V<sub>DS</sub>, T<sub>J</sub> ≤ 150 °C.

d. 1.6 mm from case.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# IRF840A, SiHF840A

Vishay Siliconix

## THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	62	$^{\circ}\text{C}/\text{W}$
Case-to-Sink, Flat, Greased Surface	$R_{thCS}$	0.50	-	
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	1.0	

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$	$I_D = 250 \mu\text{A}$	500	-	-	V	
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25 \text{ }^{\circ}\text{C}$ , $I_D = 1 \text{ mA}$		-	0.58	-	$\text{V}/^{\circ}\text{C}$	
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$		2.0	-	4.0	V	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}$		-	-	$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500 \text{ V}$ , $V_{GS} = 0 \text{ V}$		-	-	25	$\mu\text{A}$	
		$V_{DS} = 400 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 125 \text{ }^{\circ}\text{C}$		-	-	250		
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$	$I_D = 4.8 \text{ A}^b$	-	-	0.85	$\Omega$	
Forward Transconductance	$g_{fs}$	$V_{DS} = 50 \text{ V}$ , $I_D = 4.8 \text{ A}^b$		3.7	-	-	S	
<b>Dynamic</b>								
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1.0 \text{ MHz}$ , see fig. 5		-	1018	-	pF	
Output Capacitance	$C_{oss}$			-	155	-		
Reverse Transfer Capacitance	$C_{rss}$			-	8.0	-		
Output Capacitance	$C_{oss}$	$V_{GS} = 0 \text{ V}$ ; $V_{DS} = 1.0 \text{ V}$ , $f = 1.0 \text{ MHz}$			1490		nC	
Output Capacitance	$C_{oss}$	$V_{GS} = 0 \text{ V}$ ; $V_{DS} = 400 \text{ V}$ , $f = 1.0 \text{ MHz}$			42			
Effective Output Capacitance	$C_{oss \text{ eff.}}$	$V_{GS} = 0 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ to $400 \text{ V}^c$			56			
Total Gate Charge	$Q_g$	$V_{GS} = 10 \text{ V}$	$I_D = 8 \text{ A}$ , $V_{DS} = 400 \text{ V}$ , see fig. 6 and 13 <sup>b</sup>	-	-	38	ns	
Gate-Source Charge	$Q_{gs}$			-	-	9.0		
Gate-Drain Charge	$Q_{gd}$			-	-	18		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250 \text{ V}$ , $I_D = 8 \text{ A}$ $R_G = 9.1 \Omega$ , $R_D = 31 \Omega$ , see fig. 10 <sup>b</sup>		-	11	-	ns	
Rise Time	$t_r$			-	23	-		
Turn-Off Delay Time	$t_{d(off)}$			-	26	-		
Fall Time	$t_f$			-	19	-		
<b>Drain-Source Body Diode Characteristics</b>								
Continuous Source-Drain Diode Current	$I_S$	$MOSFET$ symbol showing the integral reverse p - n junction diode		-	-	8.0	A	
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$			-	-	32		
Body Diode Voltage	$V_{SD}$	$T_J = 25 \text{ }^{\circ}\text{C}$ , $I_S = 8 \text{ A}$ , $V_{GS} = 0 \text{ V}^b$		-	-	2.0	V	
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25 \text{ }^{\circ}\text{C}$ , $I_F = 8 \text{ A}$ , $dI/dt = 100 \text{ A}/\mu\text{s}^b$		-	422	633	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$			-	2.16	3.24	$\mu\text{C}$	
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$ and $L_D$ )						

### Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

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

c.  $C_{oss \text{ eff.}}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80 %  $V_{DS}$ .

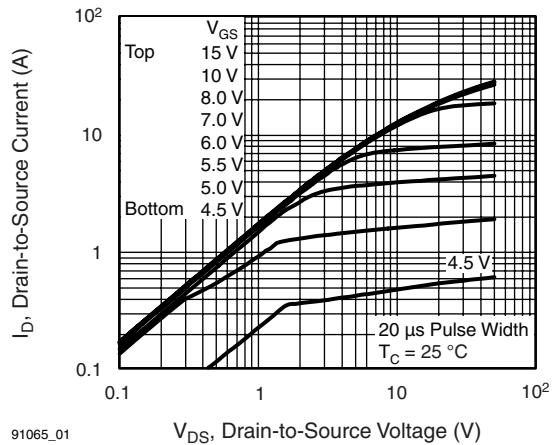
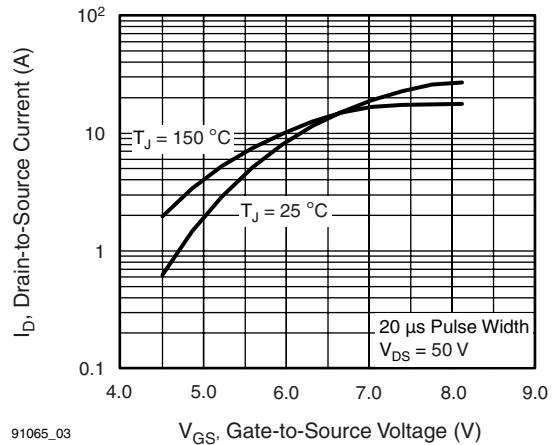
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise notedFig. 1 - Typical Output Characteristics,  $T_C = 25$  °C

Fig. 3 - Typical Transfer Characteristics

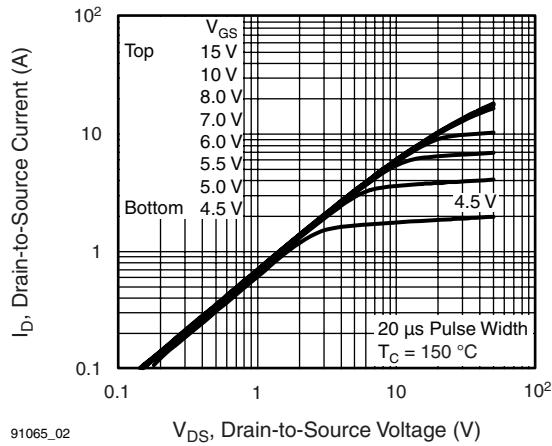
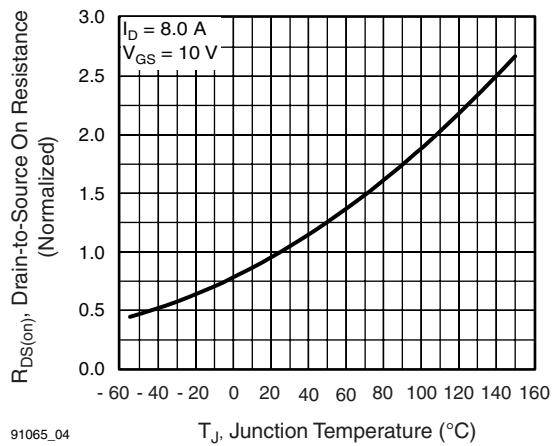
Fig. 2 - Typical Output Characteristics,  $T_C = 150$  °C

Fig. 4 - Normalized On-Resistance vs. Temperature