

General Description

IRF840 the silicon N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

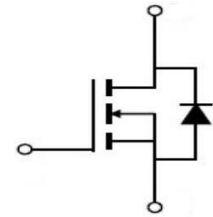
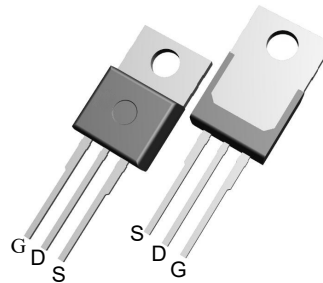


Features

V_{DSS}	500	V
I_D	10	A
$P_D(T_C=25^{\circ}\text{C})$	50	W
$R_{DS(ON)}(at V_{GS}=10V)$	<0.7	Ω

Application

- Battery protection
- Load switch
- Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRF840	TO-220	IRF840	1000

Absolute Maximum Ratings ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	500	V
I_D	Drain Current	$T_J=25^{\circ}\text{C}$	10.0
		$T_J=100^{\circ}\text{C}$	5.7
V_{GSS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note1)	190	mJ
I_{AR}	Avalanche Current (note2)	10.0	A
P_D	Power Dissipation ($T_J=25^{\circ}\text{C}$)	50	W
T_J	Junction Temperature(Max)	150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-55~+150	$^{\circ}\text{C}$
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	1.88	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics at $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	ID=250 μ A, VGS=0	500	--	--	V
△BV _{DSS} / △T _J	Breakdown Voltage Temperature Confcient	I _D =250 μ A ,Reference to 25℃	--	0.55	--	V/℃
IDSS	Zero Gate Voltage Drain Current	Vds=500V, Vgs=0V	--	--	1	μ A
		Vds=400V, Tc=125℃			10	μ A
IGSSF	Gate-body leakage Current, Forward	Vgs=+30V, Vds=0V	--	--	100	nA
IGSSR	Gate-body leakage Current,	Vgs=-30V, Vds=0V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Date Threshold Voltage	Id=250uA,Vds=Vgs	2	--	4	V
R _{DS(on)}	Static Drain-Source	Id=4.5A,Vgs=10V	--	0.65	0.70	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=25V, VGS=0, f=1.0MHz	--	1012	--	pF
Coss	Output Capacitance		--	160	--	pF
Crss	Reverse Transfer Capacitance		--	20	--	pF
Switching Characteristics						
Td(on)	Turn-On Delay Time	VDD=250V, ID=10A, RG=25 Ω (Note 3,4)	--	25	60	nS
Tr	Turn-On Rise Time		--	95	200	nS
Td(off)	Turn-Off Delay Time		--	55	120	nS
Tf	Turn-Off Fall Time		--	60	130	nS
Qg	Total Gate Charge	VDS=400,VGS=10V, ID=10 A (Note 3,4)	--	28	36	nC
Qgs	Gate-Source Charge		--	7	--	nC
Qgd	Gate-Drain Charge			12.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximun Continuous Drain-Source Diode Forward Current		--	--	9	A
I _{SM}	Maximun Plused Drain-Source DiodeForwad Current		--	--	36	A
V _{SD}	Drain-Source Diode Forward	Id=10A	--	--	1.45	V
trr	Reverse Recovery Time	I _S =10.0A,V _{GS} =0V	--	300	--	nS
Qrr	Reverse Recovery Charge	di _F /dt=100A/ μ S (Note3)	--	2.2	--	μ C

- *Notes
- 1, $L=8\text{mH}$, $I_{AS}=10\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
 - 2, Repetitive Rating : Pulse width limited by maximum junction temperature
 - 3, Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 - 4, Essentially Independent of Operating Temperature

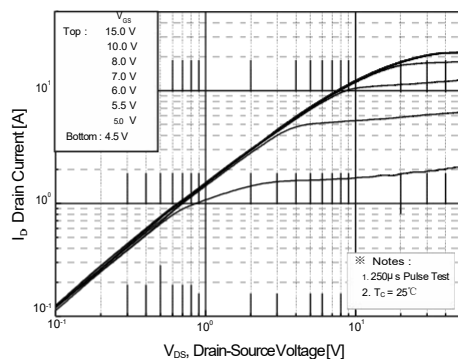


Figure 1. On-Region Characteristics

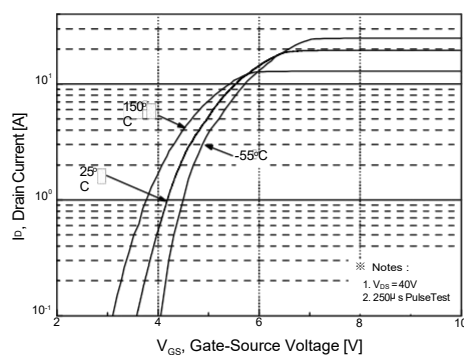


Figure 2. Transfer Characteristics

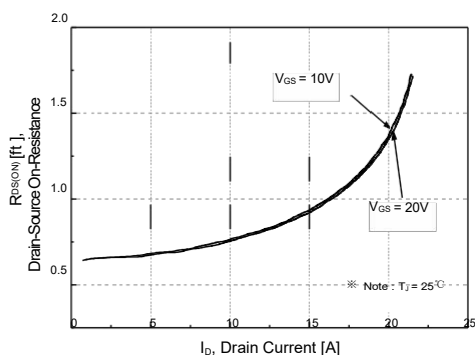


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

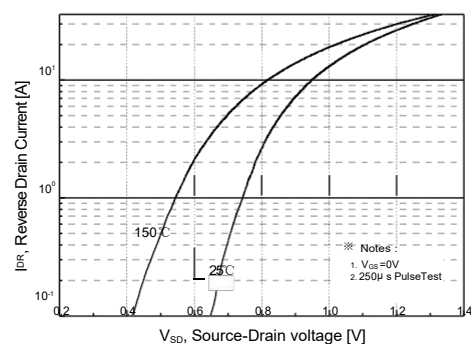


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

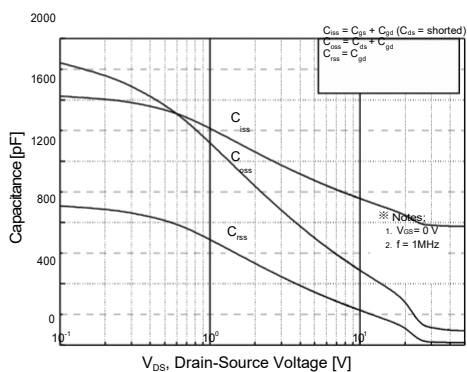


Figure 5. Capacitance Characteristics

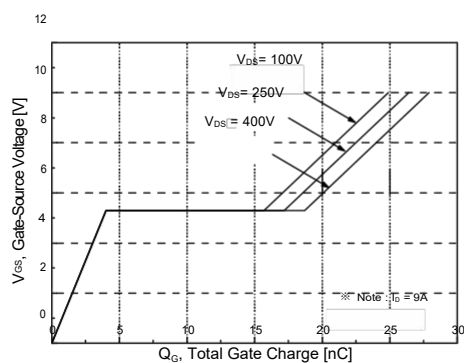


Figure 6. Gate Charge Characteristics

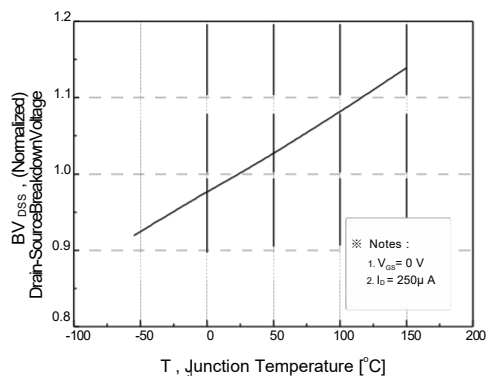


Figure 7. Breakdown Voltage Variation vs Temperature

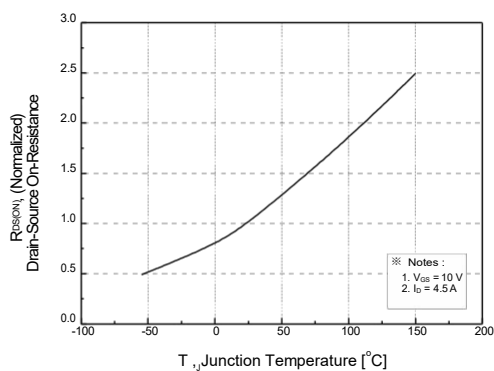


Figure 8. On-Resistance Variation vs Temperature

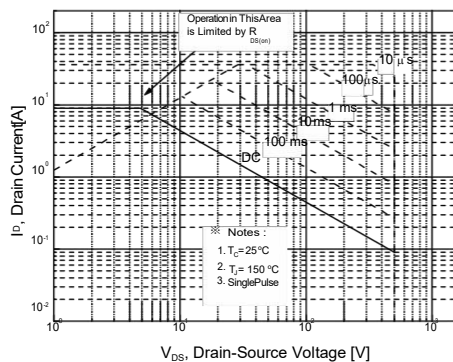


Figure 9-2. Maximum Safe Operating Area

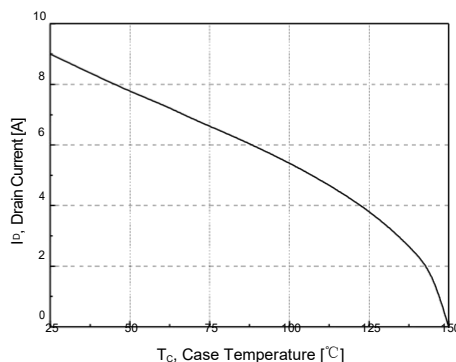


Figure 10. Maximum Drain Current vs Case Temperature

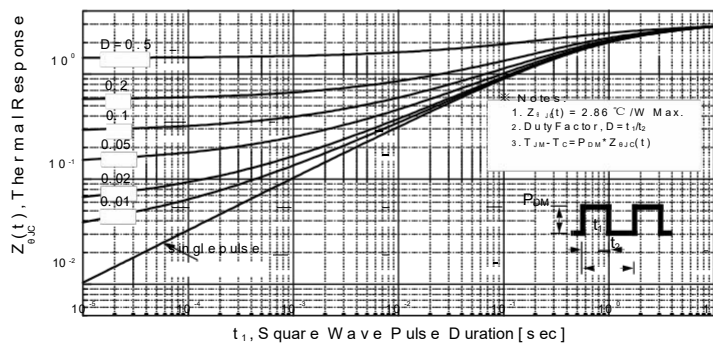
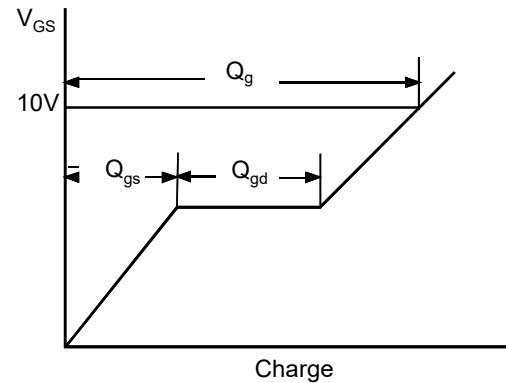
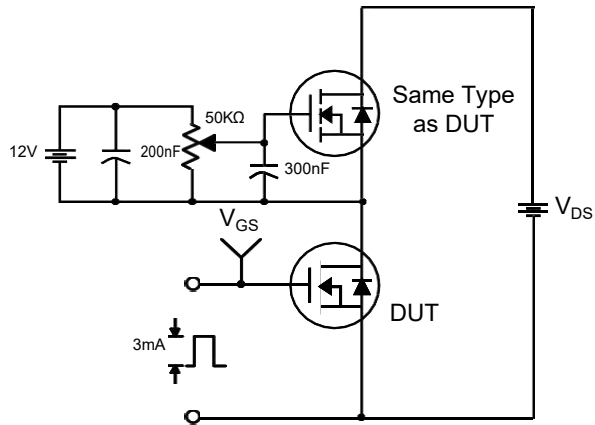
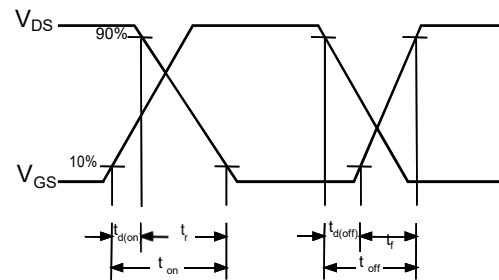
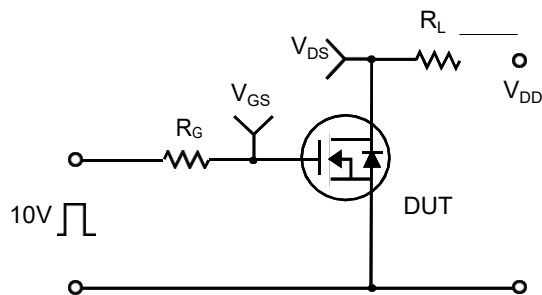


Figure 11-2. Transient Thermal Response Curve

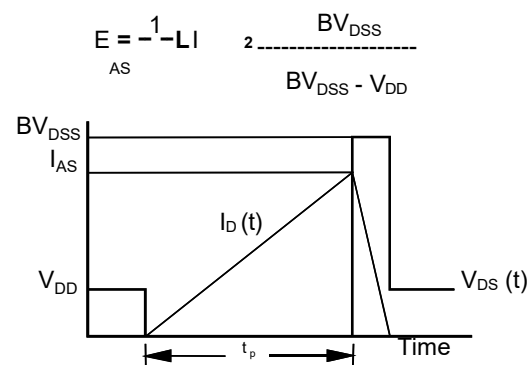
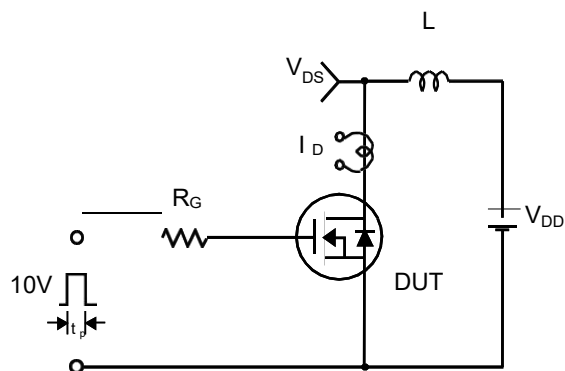
Gate Charge Test Circuit & Waveform



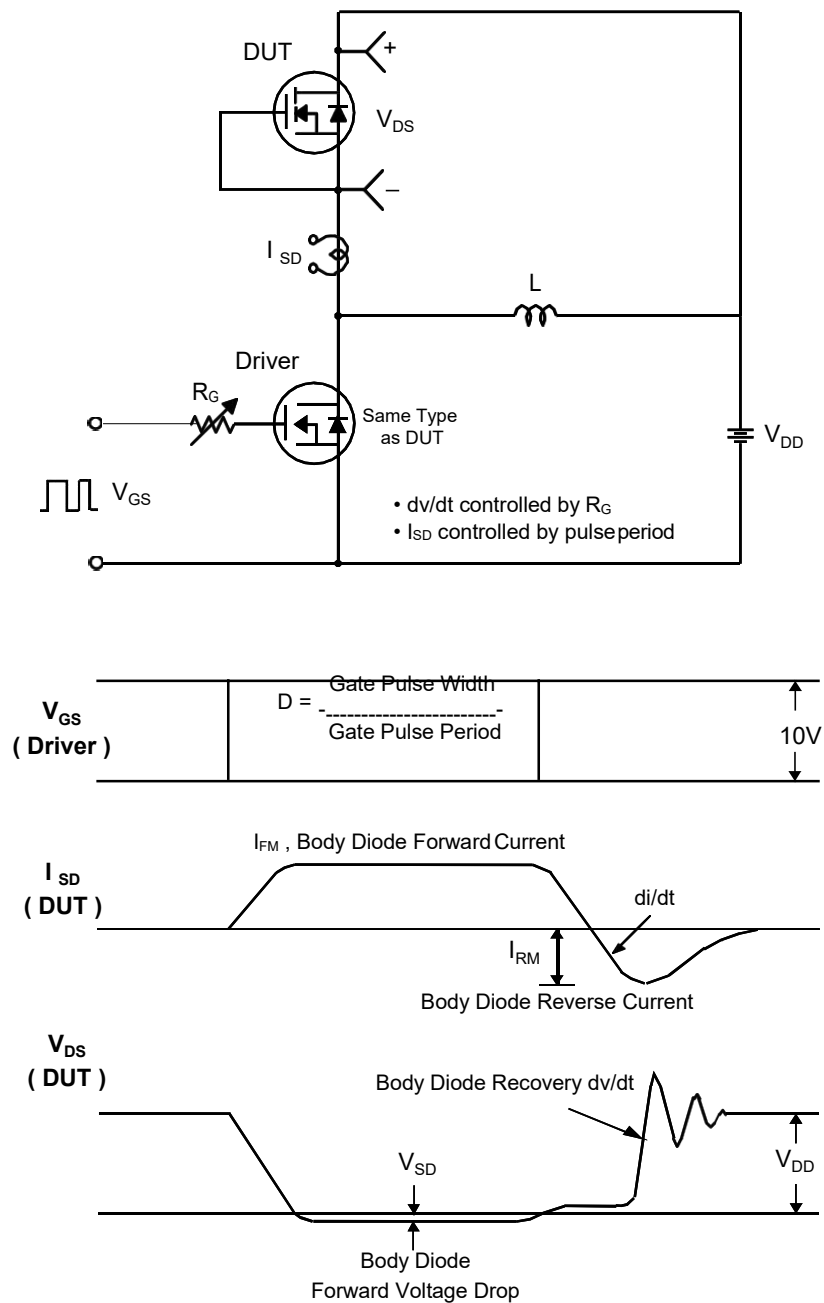
Resistive Switching Test Circuit & Waveforms



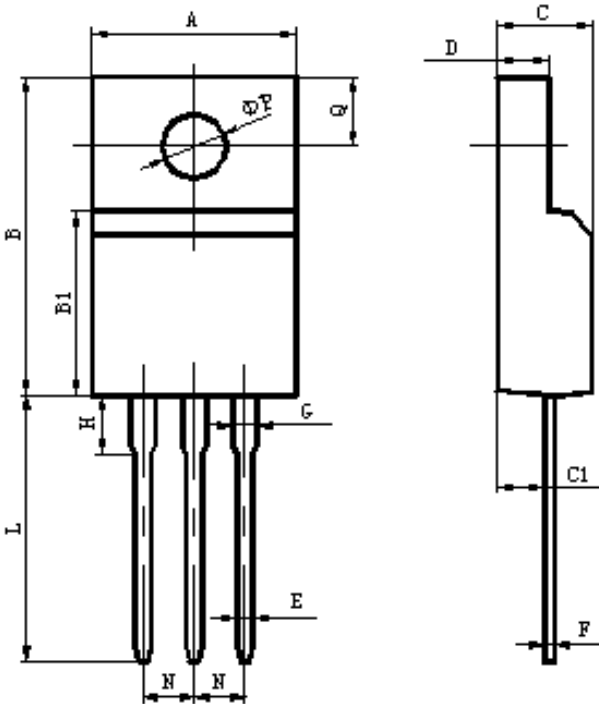
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Mechanical Data-TO-220 Single



Items	Values(mm)	
	MIN	MAX
A	9.60	10.4
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
	2.40	2.90
L*	12.0	14.0
N	2.34	2.74
Q	3.15	3.55
Φ P	2.90	3.30