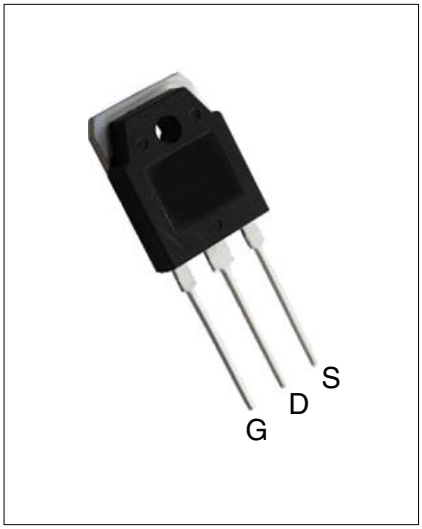
YAREN TECHNOLOGY

IRF460

Power MOSFET

21Amps, 500 Volts N-CHANNEL MOSFET



*Pb-free plating product number:IRF460

■ DESCRIPTION

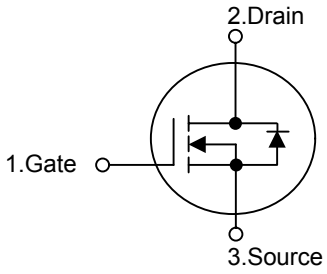
The YRIRF460 are N-Channel enhancement mode power field effect transistors (MOSFET) which are produced using YR's proprietary, planar stripe, DMOS technology.

These devices are suited for high efficiency switch mode power supply. To minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode the advanced technology has been especially tailored.

■ FEATURES

* $R_{DS(ON)}$ = 0.26Ω @V_{GS} = 10 V
* Ultra low gate charge (typical 90 nC)
* Low reverse transfer capacitance (C_{RSS} = typical 50 pF)
* Fast switching capability
* Avalanche energy specified
* Improved dv/dt capability, high ruggedness

■ SYMBOL



Electrical Characteristics (T_C = 25 °C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250uA	500	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature coefficient	I_D = 250uA, referenced to 25 °C	-	0.6	-	V/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS} = 500V, V_{GS} = 0V	-	-	10	uA
		V_{DS} = 400V, T_C = 125 °C	-	-	100	uA
I_{GSS}	Gate-Source Leakage, Forward	V_{GS} = 30V, V_{DS} = 0V	-	-	100	nA
	Gate-source Leakage, Reverse	V_{GS} = -30V, V_{DS} = 0V	-	-	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	2.0	-	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-state Resistance	V_{GS} =10 V, I_D = 10A	-	0.21	0.26	Ω
gfs	Forward Transconductance	V_{DS} =50V , I_D =10.0A	-	15	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} =0 V, V_{DS} =25V, f = 1MHz	-	3350	-	pF
C_{oss}	Output Capacitance		-	490	-	
C_{rss}	Reverse Transfer Capacitance		-	50	-	
Dynamic Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD} =250V, I_D =20.0A, R_G =25Ω (Note 4, 5)	-	60	-	ns
t_r	Rise Time		-	210	-	
$t_{d(off)}$	Turn-off Delay Time		-	170	-	
t_f	Fall Time		-	130	-	
Q_g	Total Gate Charge	V_{DS} =400V, V_{GS} =10V, I_D =20.0A (Note 4, 5)	-	90	-	nC
Q_{gs}	Gate-Source Charge		-	20	-	
Q_{gd}	Gate-Drain Charge(Miller Charge)		-	42	-	

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I_S	Continuous Source Current	Integral Reverse p-n Junction Diode in the MOSFET	-	-	20	A
I_{SM}	Pulsed Source Current		-	-	80	
V_{SD}	Diode Forward Voltage	I_S =20.0A, V_{GS} =0V	-	-	1.4	V
t_{rr}	Reverse Recovery Time	I_S=20.0A, V_{GS}=0V, dI_F/dt=100A/us	-	370	-	ns
Q_{rr}	Reverse Recovery Charge		-	380	-	nC

※ NOTES

1. Repeativity rating : pulse widt h limited by junction temperature
2. L = 5.0mH, I_{AS} =20.0A, V_{DD} = 50V, R_G = 25Ω , Starting T_J = 25°C
3. $I_{SD} \leq$ 20.0A, di/dt $\leq$ 200A/us, $V_{DD} \leq BV_{DSS}$, Starting T_J = 25°C
4. Pulse Test : Pulse Width $\leq$ 300us, Duty Cycle $\leq$ 2%
5. Essentially independent of operating temperature.

Typical Characteristics

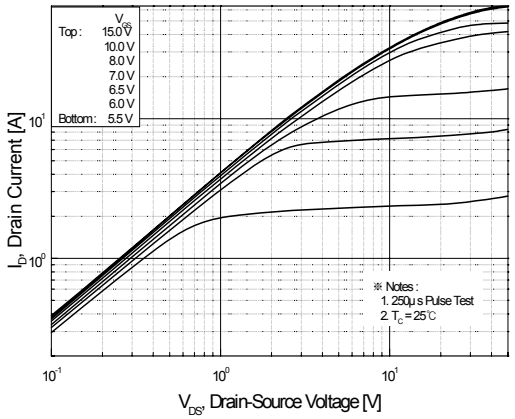


Figure 1. On-Region Characteristics

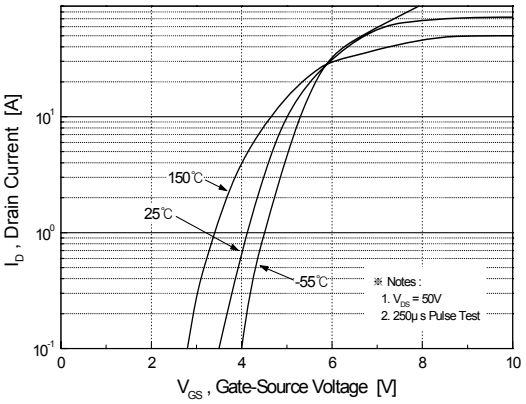


Figure 2. Transfer Characteristics

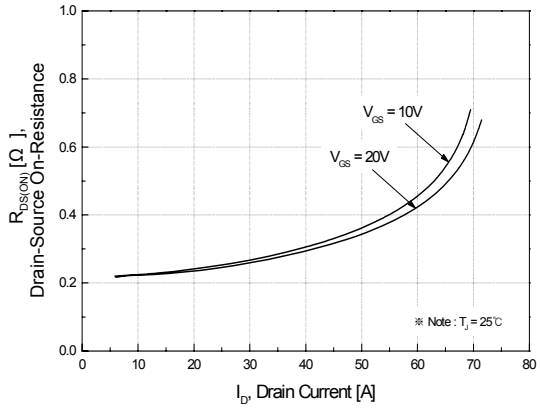


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

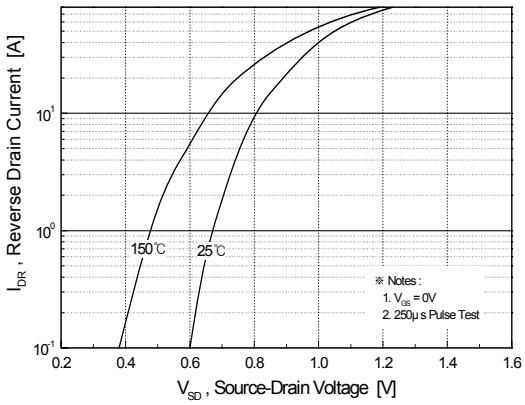


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

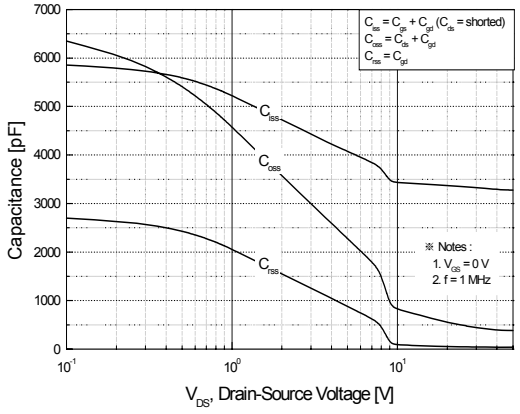


Figure 5. Capacitance Characteristics

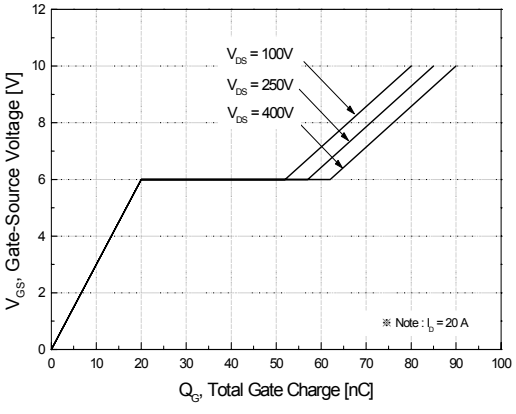


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

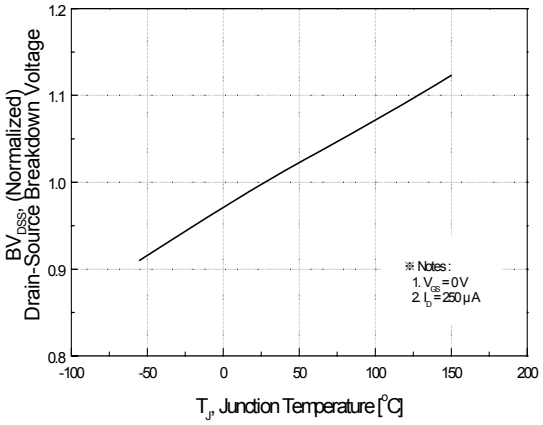


Figure 7. Breakdown Voltage Variation vs. Temperature

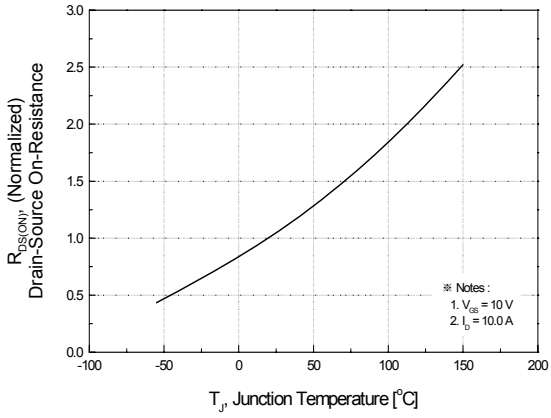


Figure 8. On-Resistance Variation vs. Temperature

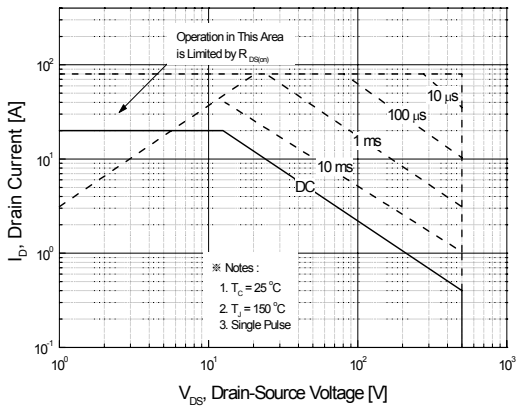


Figure 9. Maximum Safe Operating Area

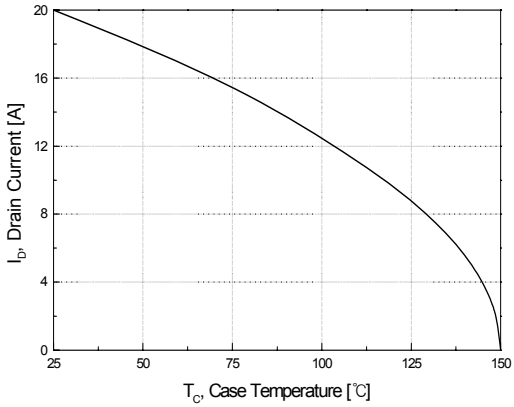


Figure 10. Maximum Drain Current vs. Case Temperature

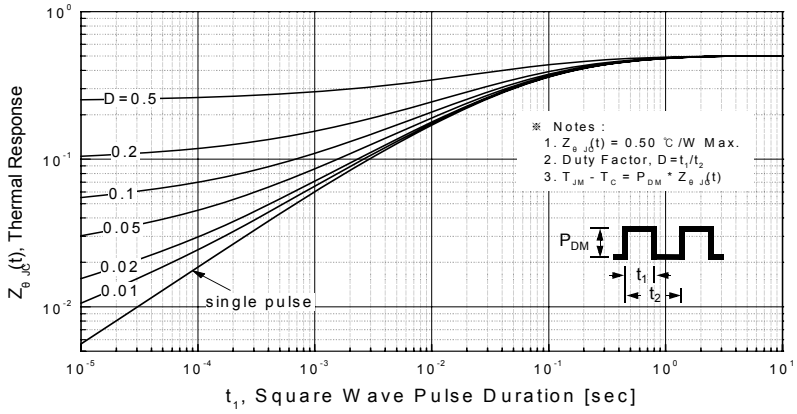
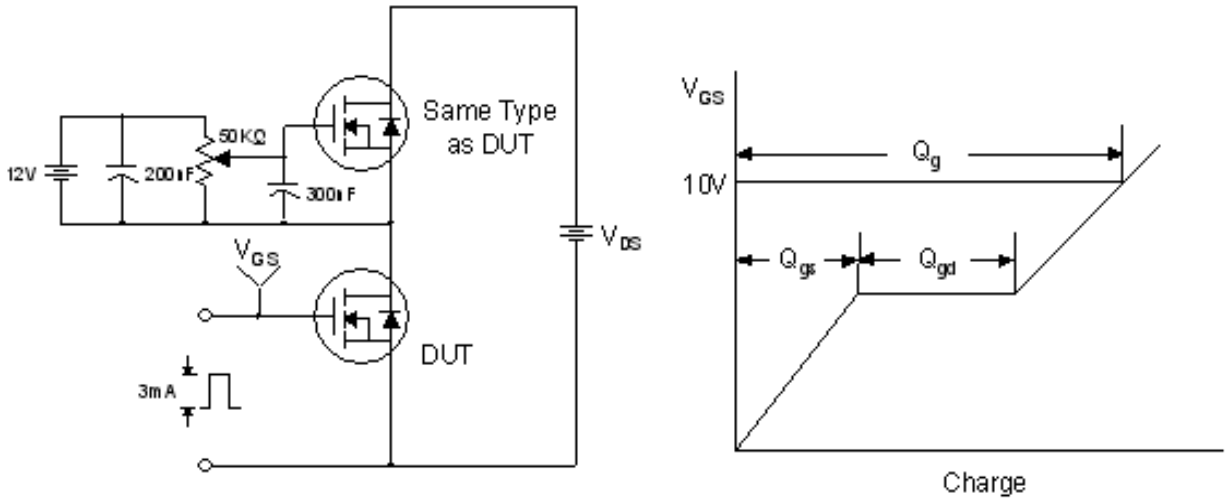
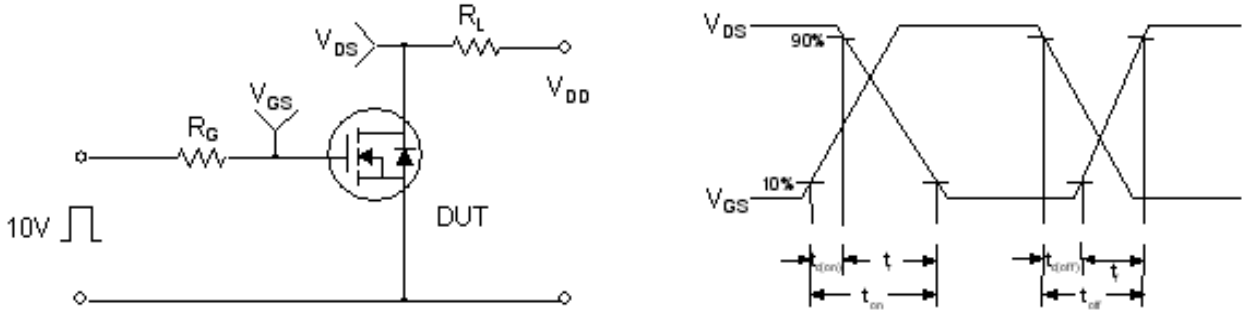


Figure 11. Transient Thermal Response Curve

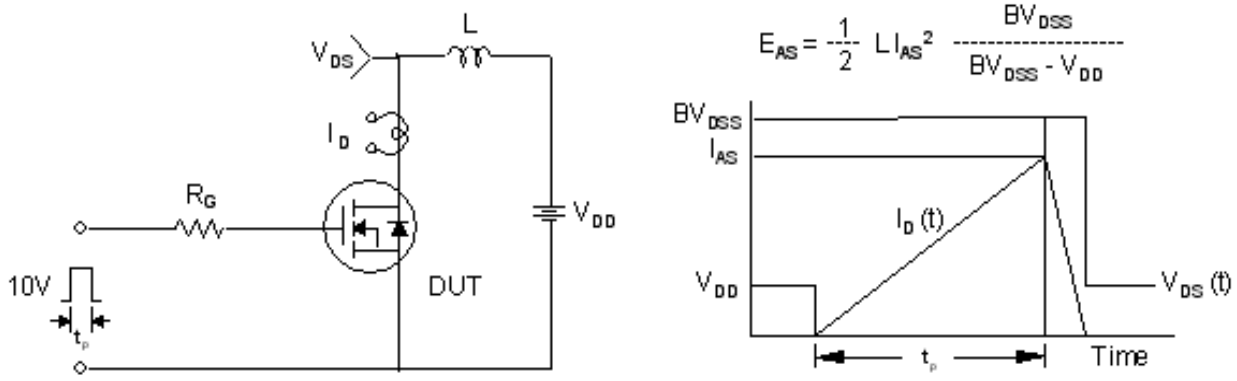
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms