N-Channel Enhancement Mode Power MOSFET

General Description

The UV1404R uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

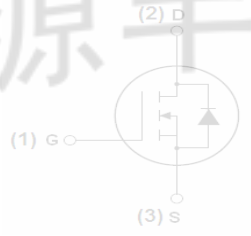
Features

- V_{DS}=40V； I_D=190A@ V_{GS}=10V；
  $R_{DS(ON)}$< 4 mΩ @ V_{GS} =10V
- Special process technology for high ESD capability
- Special designed for Convertors and power controls
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

TO-220-3L top view



Schematic diagram

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
UV1404R	UV1404R	TO-220	-	-	Y

Table 1. Absolute Maximum Ratings (TA=25℃)

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS}=0V）	V_{DS}	40	V
Gate-Source Voltage (V_{DS}=0V)	V_{GS}	±25	V
Drain Current (DC) at Tc=25℃	$I_{D\ (DC)}$	190	A
Drain Current (DC) at Tc=100℃	$I_{D\ (DC)}$	130	A
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_{DM\ (pluse)}$	430	A
Maximum Power Dissipation(Tc=25℃)	P_D	230	W
Derating factor		1.33	W/℃
Single pulse avalanche energy (Note 2)	E_{AS}	1000	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.EAS condition：Tj=25℃,V_{DD}=28V,VG=10V,L= 1mH ,R_g=25Ω;

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance，Junction-to-Case（Note2）	R_{thJC}	0.75	℃/W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40			V
Zero Gate Voltage Drain Current(Tc=25℃)	I_{DSS}	V_{DS}=-24V,V_{GS}=0V			1	μA
Gate-Body Leakage Current	I_{DSS}	V_{GS}=±25V,V_{DS}=0V			±100	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	-	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A		3	4	mΩ
Dynamic Characteristics						
Forward Transconductance	G_{FS}	V_{DS}=25V,I_D=40A	50			S
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz		5000		PF
Output Capacitance	C_{oss}			860		PF
Reverse Transfer Capacitance	C_{rss}			480		PF
Total Gate Charge	Q_g	V_{DS}=30V,I_D=40A, V_{GS}=10V		106		nC
Gate-Source Charge	Q_{gs}			20		nC
Gate-Drain Charge	Q_{gd}			35		nC
Switching times						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=1A,R_L=30Ω V_{GS}=10V,R_G= 6 Ω		34	50	nS
Turn-on Rise Time	t_r			30	46	nS
Turn-Off Delay Time	$t_{d(off)}$			124	200	nS
Turn-Off Fall Time	t_f			64	116	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}				40	A
Forward on voltage(Note 3)	V_{SD}	Tj=25℃,I_{SD}=20A,V_{GS}=0V		0.8	1.3	V
Reverse Recovery Time(Note 1)	t_{rr}	Tj=25℃,I_F=40A,di/dt=100A/μs		74		nS
Reverse Recovery Charge	Q_{rr}			140		nC
Forward Turn-on Time	t_{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

Notes 3.Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%, R_G =25 Ω, Starting Tj=25℃

Test circuit

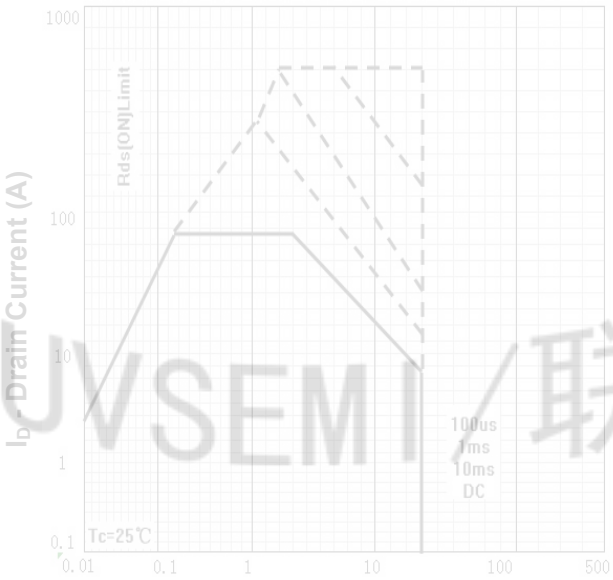
1）E_{AS} test Circuits

2）Gate charge test Circuit:

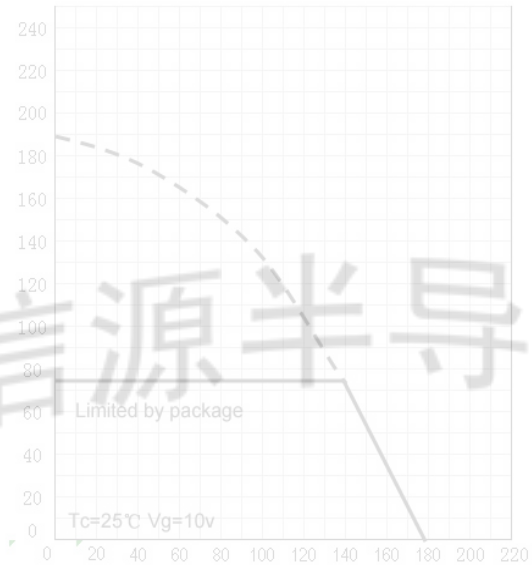
3）Switch Time Test Circuit:

Typical Characteristics

Safe Operation Area



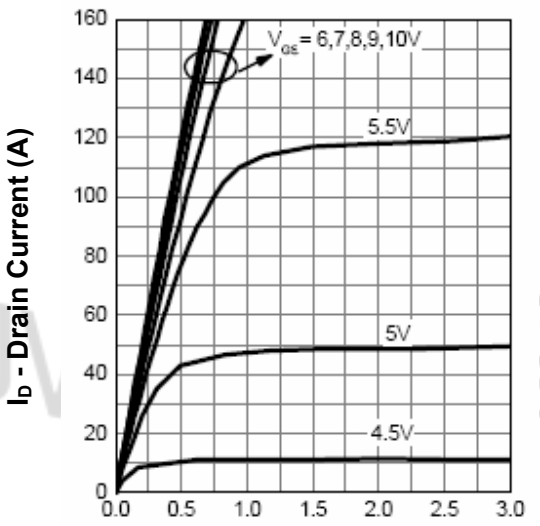
Drain Current



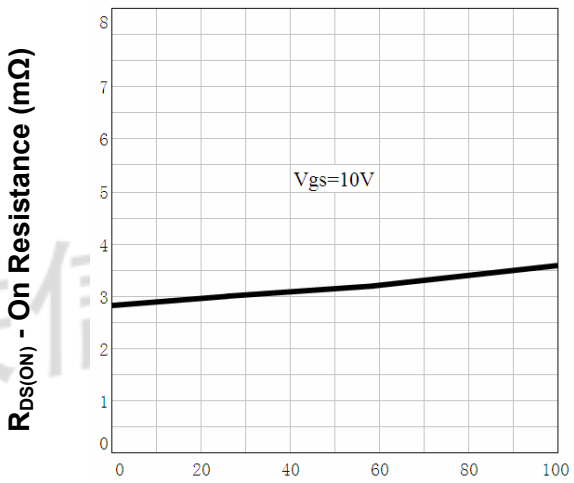
Thermal Transient Impedance

Typical Characteristics (Cont.)

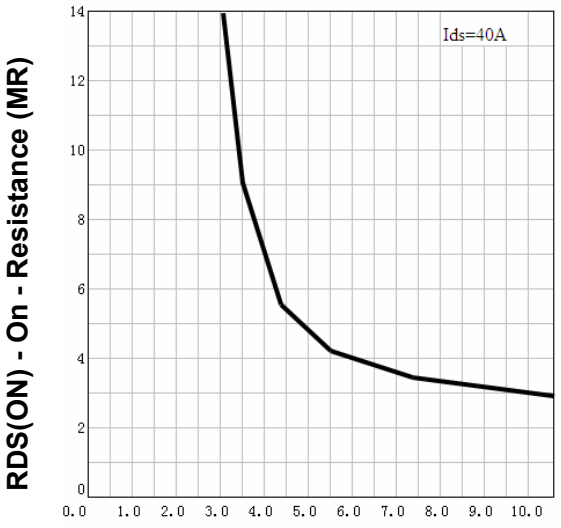
Output Characteristics



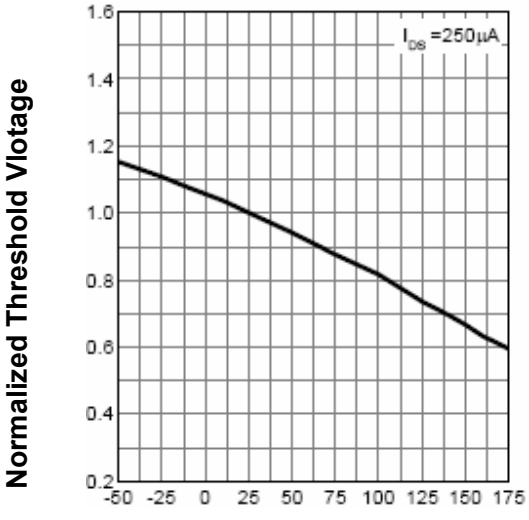
Drain-Source On Resistance



Drain-Source On Resistance

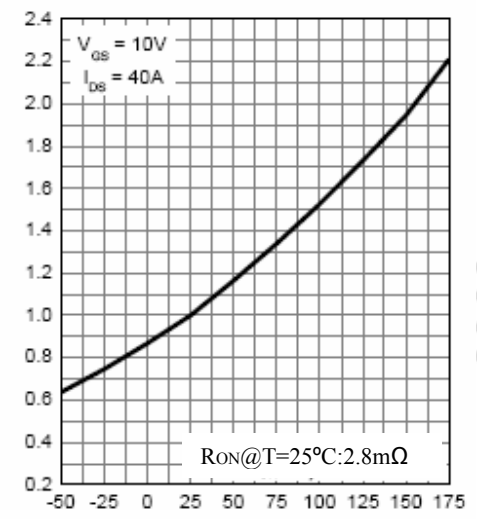


Gate Threshold Voltage



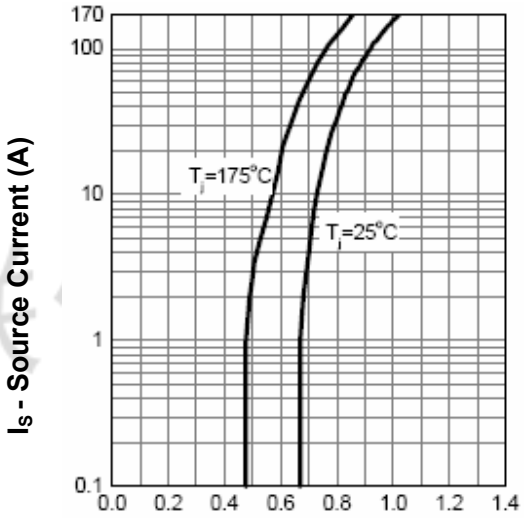
Typical Characteristics (Cont.)

Drain-Source On Resistance



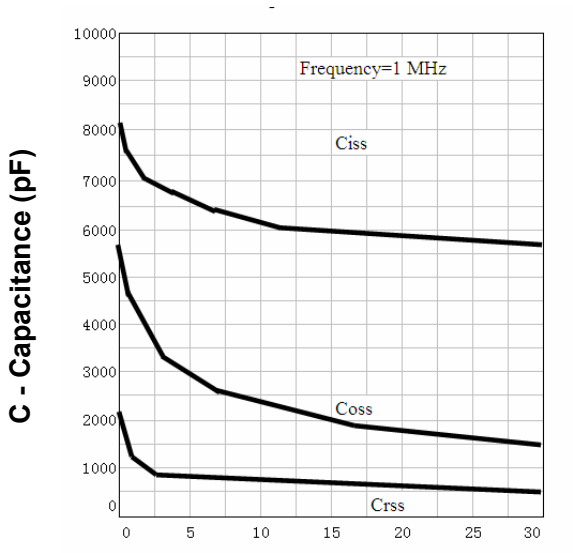
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



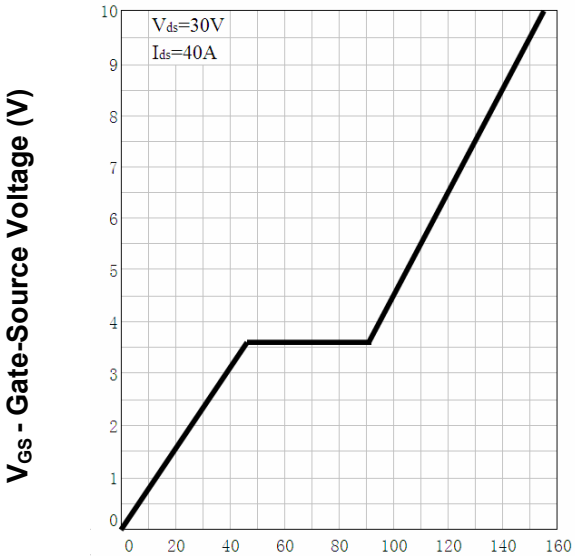
V_{SD} - Source-Drain Voltage (V)

Capacitance



V_{DS} - Drain-Source Voltage (V)

Gate Charge



Q_G - Gate Charge (nC)