N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☑ Surface-mounted package
- ☑ Advanced trench cell design

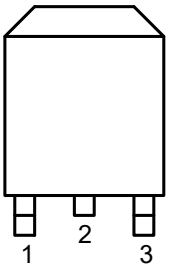
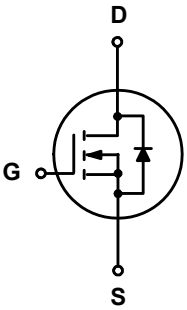
1.2 Applications

- ☑ MB and NB
- ☑ TV and Monitor
- ☑ DC to DC Converter
- ☑ LCD Inverter

1.3 Quick reference

- ☑ BV ≧ 40 V
- ☑ P_{tot} ≦ 78 W
- ☑ I_D ≦ 90 A
- ☑ $R_{DS(ON)}$ ≦ 3.0 mΩ@ V_{GS} = 10 V
- ☑ $R_{DS(ON)}$ ≦ 7.0 mΩ@ V_{GS} = 6 V

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate (G)		
2	Drain (D)		
3	Source (S)		

Top View
TO-252-3L

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	-	40	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	±20	V
I_D***	Drain Current (DC)	T_C = 25 ℃, V_{GS} = 10 V	-	90	A
		T_C = 100 ℃, V_{GS} = 10 V	-	60	A
I_{DM}**	Drain Current (Pulsed)	T_C = 25 ℃, V_{GS} = 10 V	-	240	A
P_{tot}	Drain power dissipation	T_C = 25 ℃	-	78	W
T_{stg}	Storage Temperature		-55	150	℃
T_J	Junction Temperature		-	150	℃
I_S	Continuous-Source Current	T_C = 25 ℃	-	90	A
E_{AS}	Single Pulsed Avalanche Energy	V_{DD}=40V , L=1.0mH	-	338	mJ
$R_{\theta JA}$*	Thermal Resistance- Junction to Ambient		-	45	℃/W
$R_{\theta JC}$	Thermal Resistance- Junction to Case		-	1.6	

Notes：

* Surface Mounted on 1 in^2 pad area, t ≤ 10 sec

** Pulse width ≤ 300 μs, duty cycle ≤ 2 %

*** Limited by bonding wire

4. Marking Information

Product Name	Marking
UP3R0N04KH	3R0N04H YWWXXX YWWXXX: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP3R0N04KH	TO252			2500	

6. Electrical Characteristics (T_A = 25 °C Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 250 μA	40	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = 250 μA	2	-	4	V
I_{DSS}	Drain Leakage Current	V_{DS} = 32 V, V_{GS} = 0 V	-	-	1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = 0 V, V_{GS} = ± 20 V	-	-	±100	nA
$R_{DS(ON)}$[a]	On-State Resistance	V_{GS} = 10 V, I_{DS} = 20 A	-	2.5	3.0	mΩ
		V_{GS} = 6 V, I_{DS} = 10 A	-	5.4	7.0	
Diode Characteristics						
V_{SD}[a]	Diode Forward Voltage	I_{SD} = 20 A, V_{GS} = 0 V	-	-	1.3	V
t_{rr}	Reverse Recovery Time	I_{DS} = 20 A, V_{GS} = 0 V dI_{SD}/dt = 100 A/μs	-	41	-	nS
Q_{rr}	Reverse Recovery Charge		-	29	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 20 V Frequency = 1 MHz	-	2065	-	pF
C_{oss}	Output Capacitance		-	985	-	
C_{rss}	Reverse Transfer Capacitance		-	101	-	
t_d(on)	Turn-on Delay Time	V_{DS} = 20 V, V_{GEN} = 10 V, R_G = 3.9 Ω, R_L = 1 Ω, I_{DS} = 20 A	-	14	-	nS
t_r	Turn-on Rise Time		-	61	-	
t_d(off)	Turn-off Delay Time		-	29	-	
t_f	Turn-off Fall Time		-	37	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{DS} = 20 V, V_{GS} = 10 V, I_{DS} = 20 A	-	39	-	nC
Q_{gs}	Gate-Source Charge		-	12	-	
Q_{gd}	Gate-Drain Charge		-	10	-	

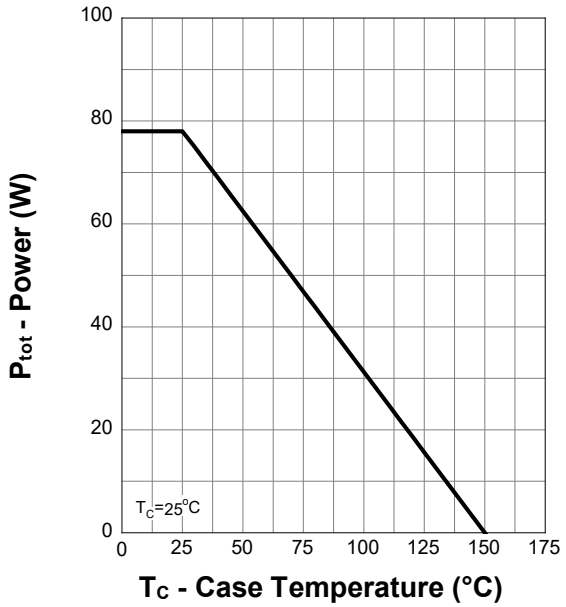
Notes：

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%

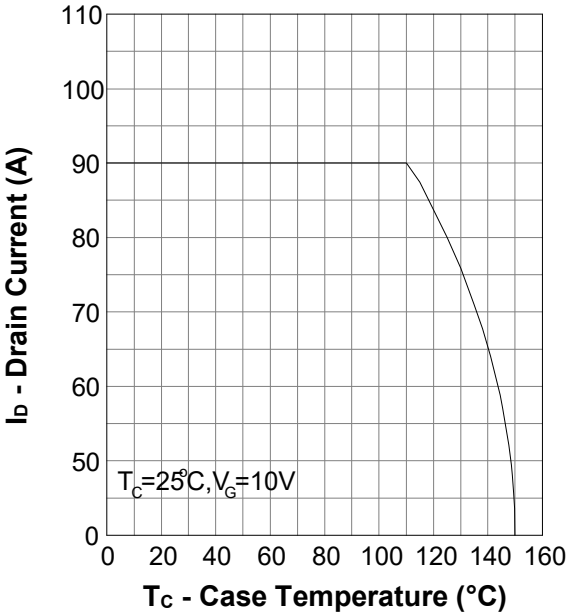
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

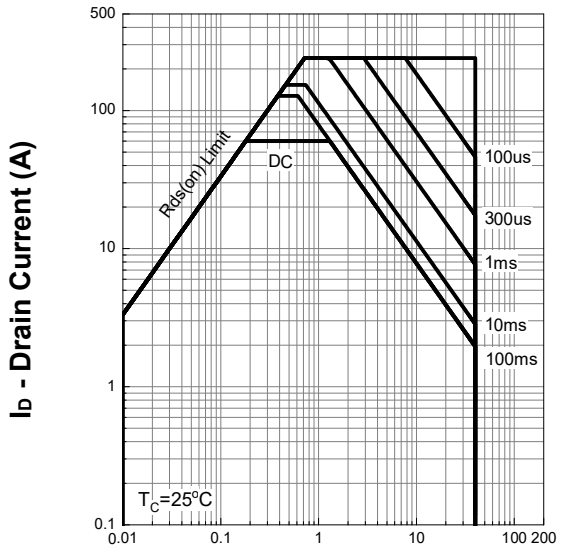
Power Capability



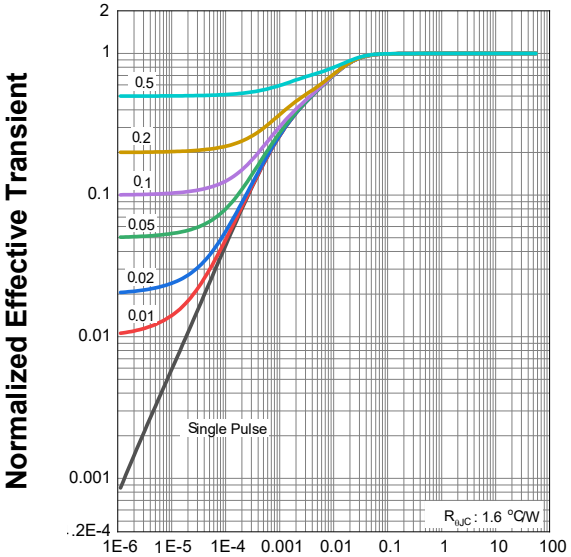
Current Capability



Safe Operating Area

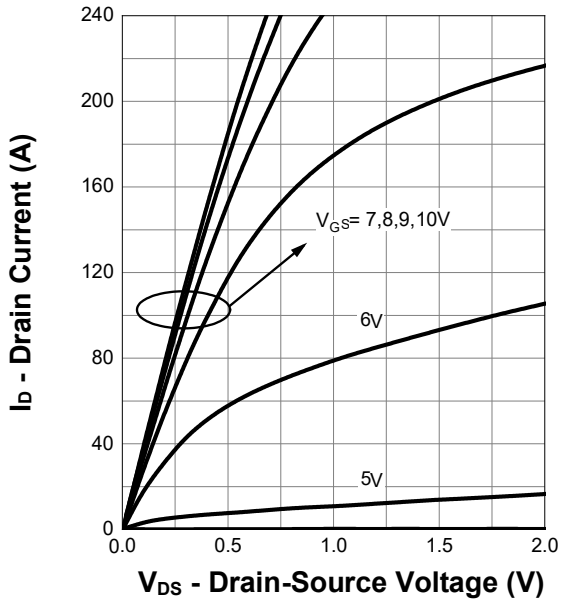


Transient Thermal Impedance

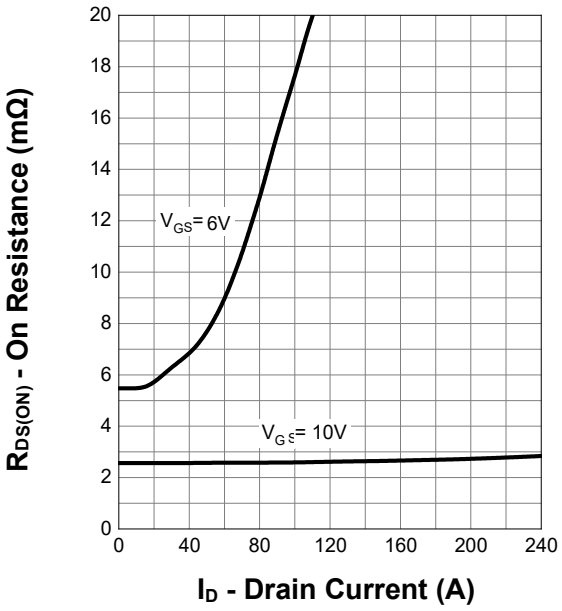


7. Typical Characteristics (cont.)

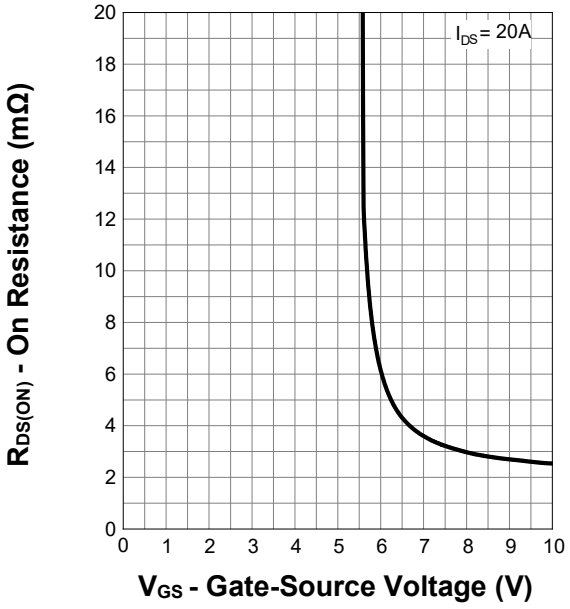
Output Characteristics



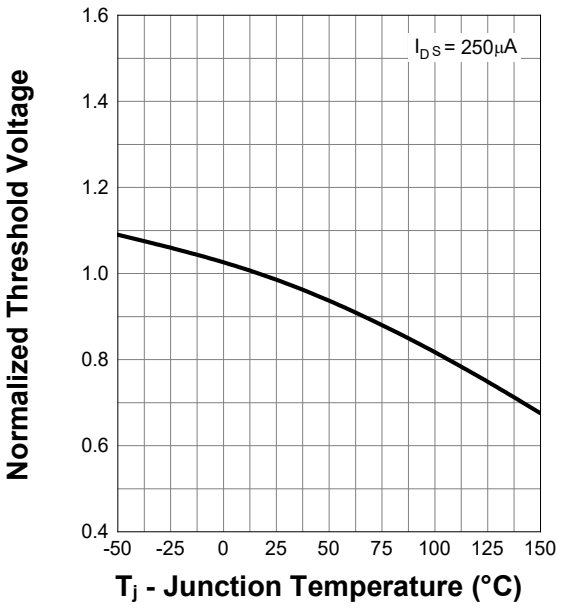
On Resistance



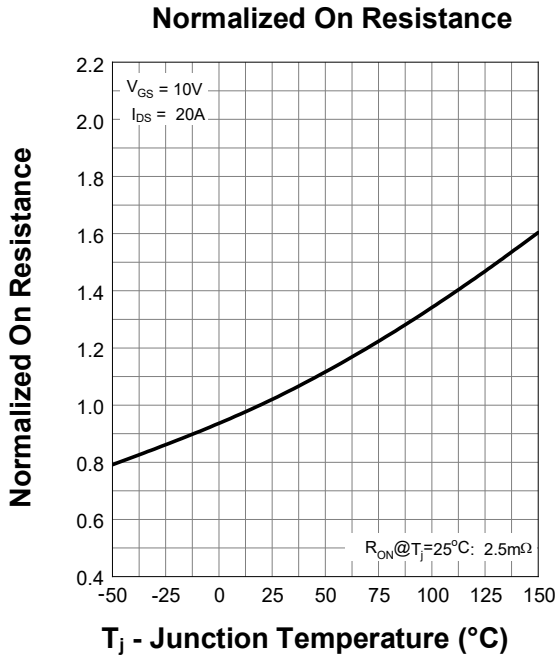
Transfer Characteristics

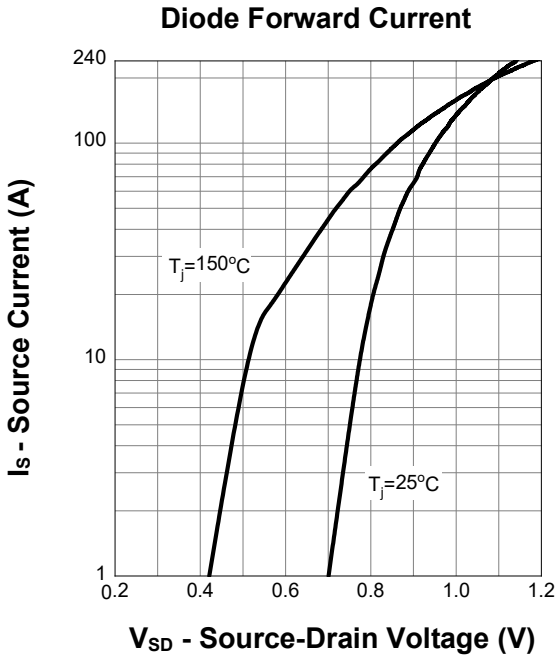


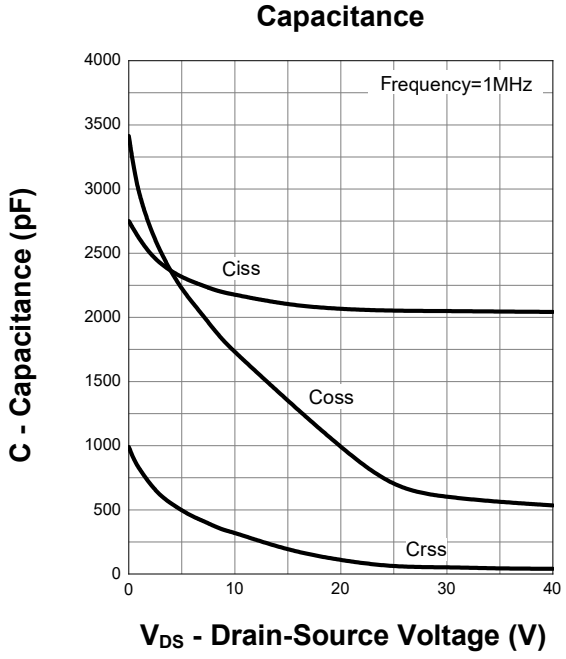
Normalized Threshold Voltage

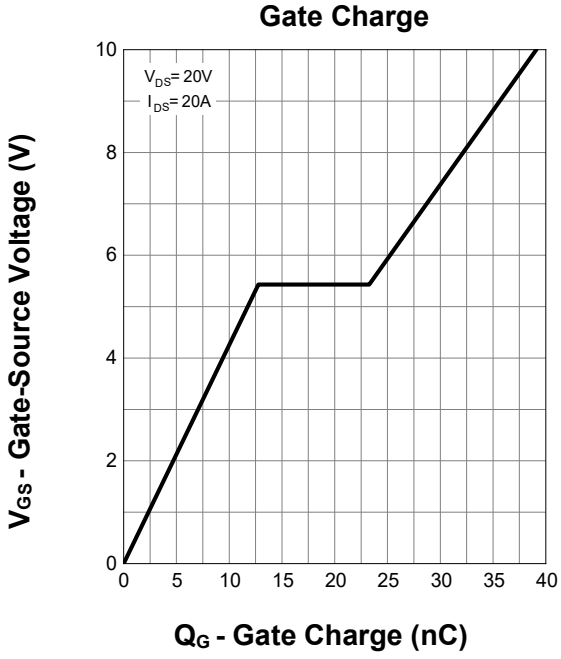


7. Typical Characteristics (cont.)



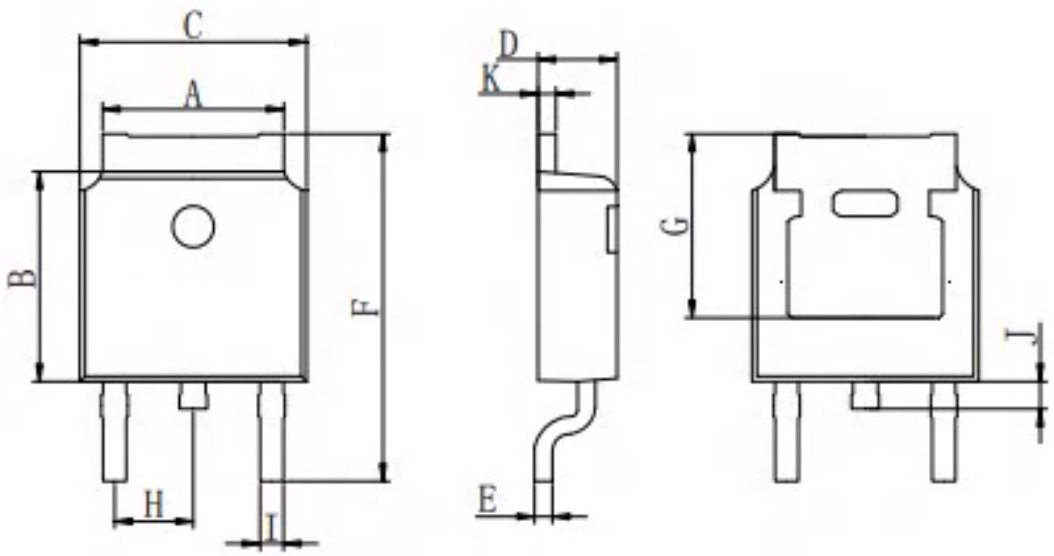






8.Package Dimensions

TO-252-3L



SYMBOL	Dimension in mm	
	MIN.	MAX.
A	5.05	5.65
B	5.80	6.40
C	6.25	6.85
D	2.08	2.48
E	0.40	0.61
F	9.56	10.46
G	5.05	5.65
H	2.09	2.50
I	0.66	0.90
J	0.50	1.20
K	0.40	0.61