

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

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

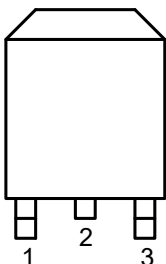
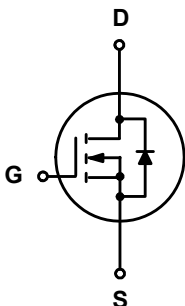
1.2 Applications

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

1.3 Quick reference

- ☒ $BV \geq 40\text{ V}$
- ☒ $P_{tot} \leq 96\text{ W}$
- ☒ $I_D \leq 180\text{ A}$
- ☒ $R_{DS(ON)} \leq 1.5\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ☒ $R_{DS(ON)} \leq 2.3\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate (G)	 Top View TO-252-3L	
2	Drain (D)		
3	Source (S)		

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{DS}	Drain-Source Voltage	T _C = 25 °C	-	40	V
V _{GS}	Gate-Source Voltage	T _C = 25 °C	-	±20	V
I _D	Drain Current (DC)	T _C = 25 °C, V _{GS} = 10 V	-	180	A
		T _C = 100 °C, V _{GS} = 10 V	-	123	A
I _{DM} **	Drain Current (Pulsed)	T _C = 25 °C, V _{GS} = 10 V	-	720	A
P _{tot}	Drain power dissipation	T _C = 25 °C	-	96	W
T _{stg}	Storage Temperature		-55	150	°C
T _J	Junction Temperature		-	150	°C
I _S	Continuous-Source Current	T _C = 25 °C	-	180	A
E _{AS}	Single Pulsed Avalanche Energy	V _{DD} =40V , L=1.0mH	-	800	mJ
R _{θJA} *	Thermal Resistance- Junction to Ambient		-	49	°C/W
R _{θJC}	Thermal Resistance- Junction to Case		-	1.3	

Notes :

- * Surface Mounted on 1 in² pad area, t ≤ 10 sec
- ** Pulse width ≤ 300 μs, duty cycle ≤ 2 %
- *** Limited by bonding wire

4. Marking Information

Product Name	Marking
UP1R5N04KL	1R5N04L YWWXXX YWWXXX: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP1R5N04KL	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	1	-	2.5	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} = 30 A	-	1.3	1.5	mΩ
		V _{GS} = 4.5 V, I _{DS} = 20 A	-	1.8	2.3	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 30 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{DS} = 30 A, V _{GS} = 0 V dI _{SD} /dt = 100 A/μs	-	61	-	nS
Q _{rr}	Reverse Recovery Charge		-	57	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V Frequency = 1 MHz	-	5705	-	pF
C _{oss}	Output Capacitance		-	2170	-	
C _{rss}	Reverse Transfer Capacitance		-	176	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 30 V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 1 Ω, I _{DS} = 30 A	-	16	-	nS
t _r	Turn-on Rise Time		-	91	-	
t _{d(off)}	Turn-off Delay Time		-	104	-	
t _f	Turn-off Fall Time		-	114	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} = 20 V, V _{GS} = 10 V, I _{DS} = 30 A	-	112	-	nC
Q _{gs}	Gate-Source Charge		-	21	-	
Q _{gd}	Gate-Drain Charge		-	24	-	

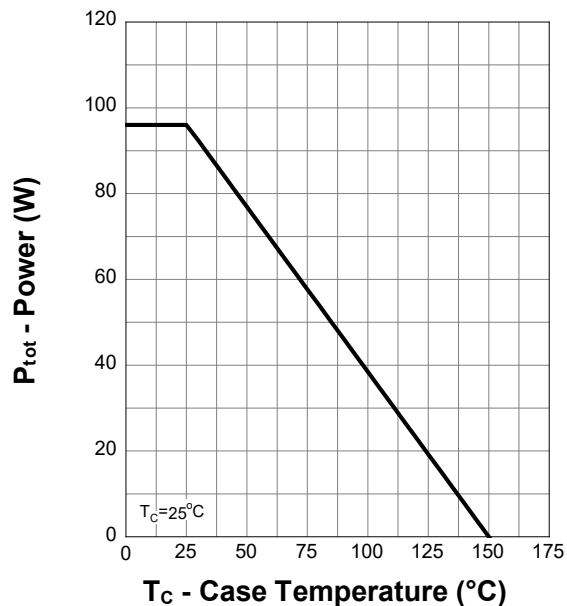
Notes :

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

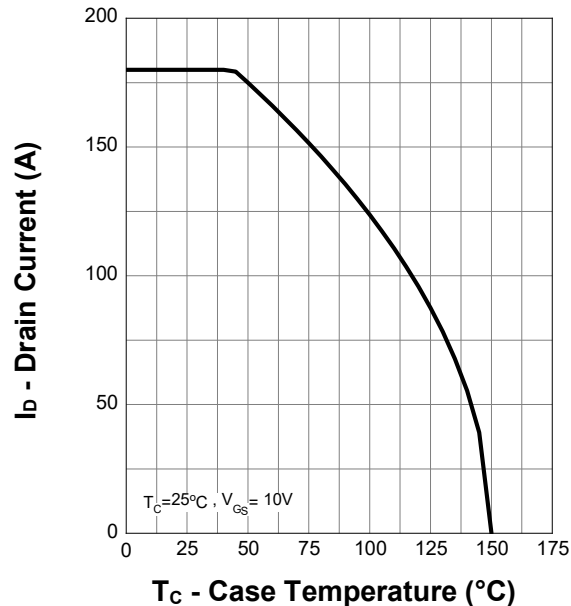
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

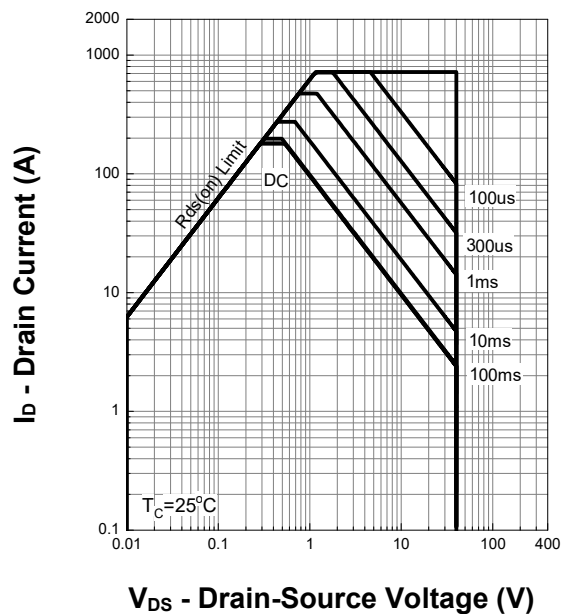
Power Capability



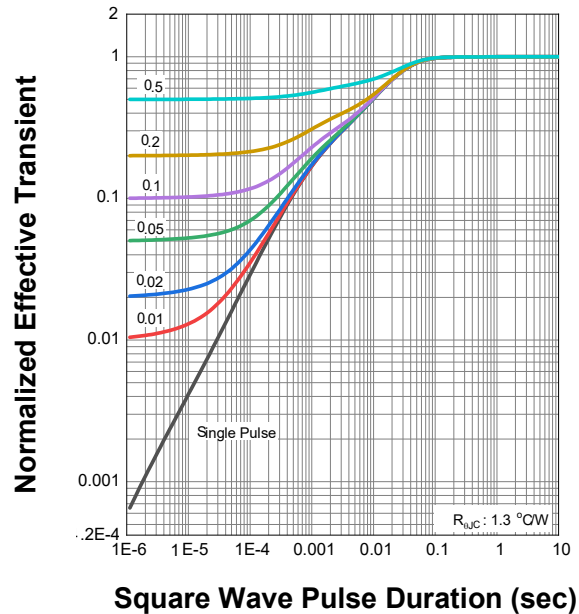
Current Capability



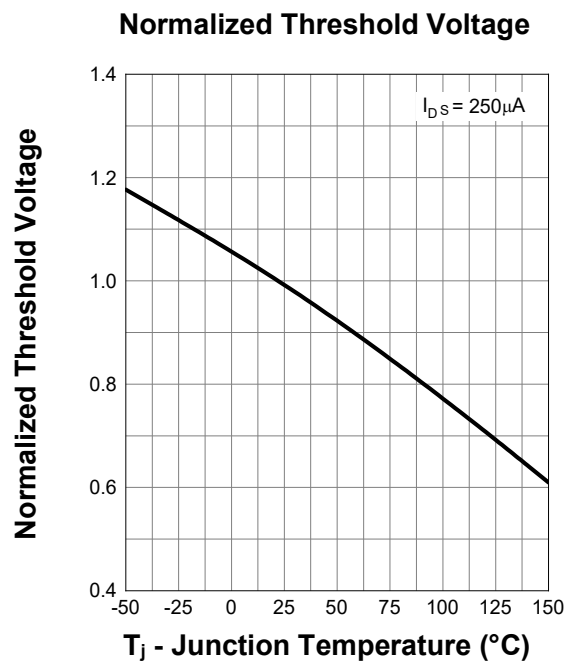
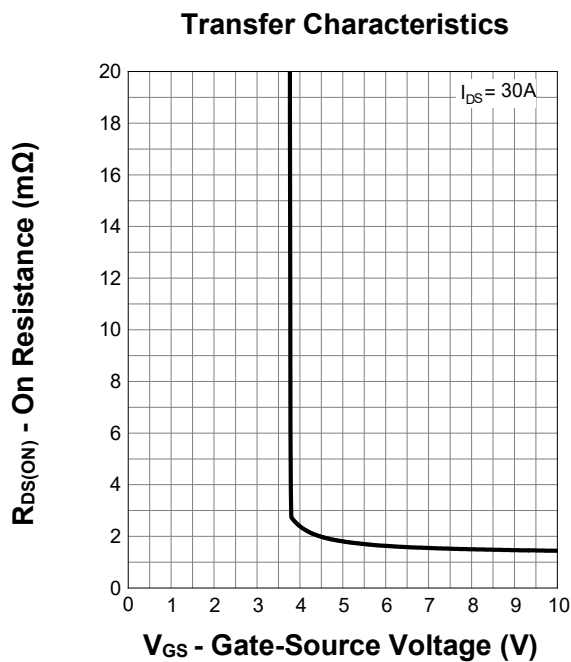
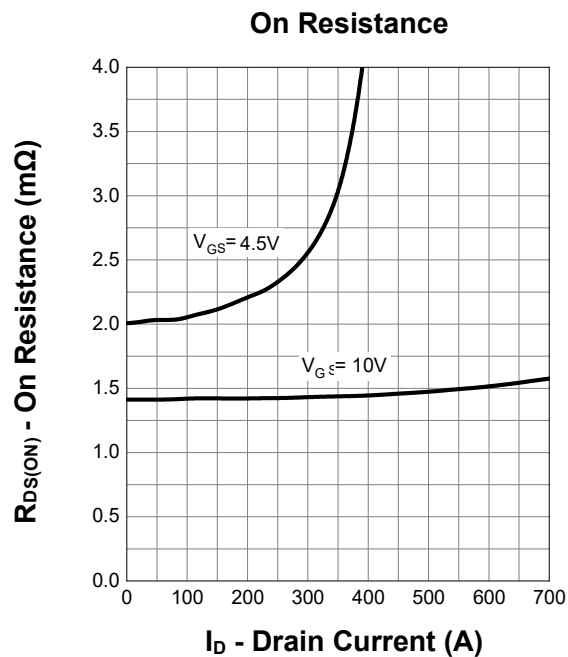
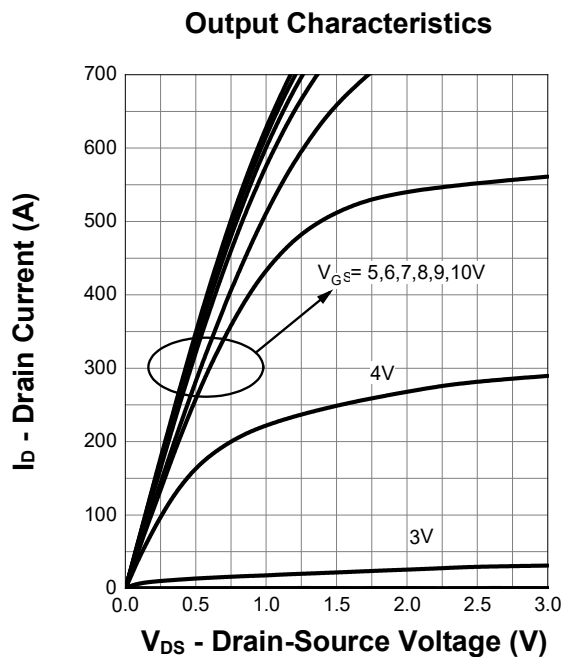
Safe Operating Area



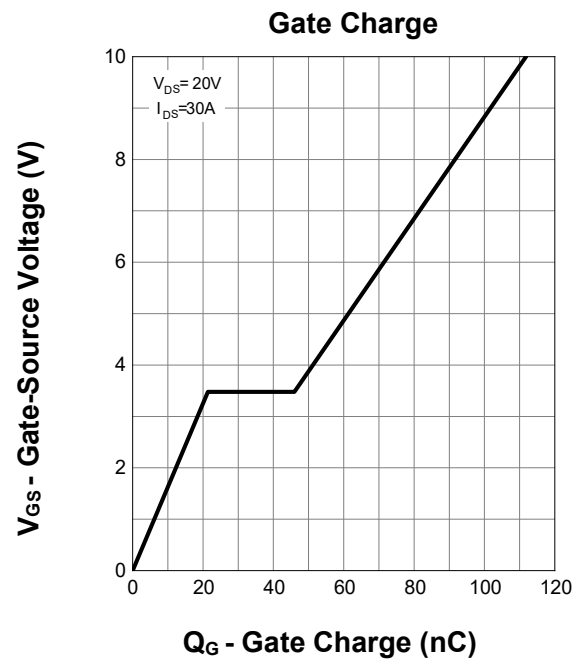
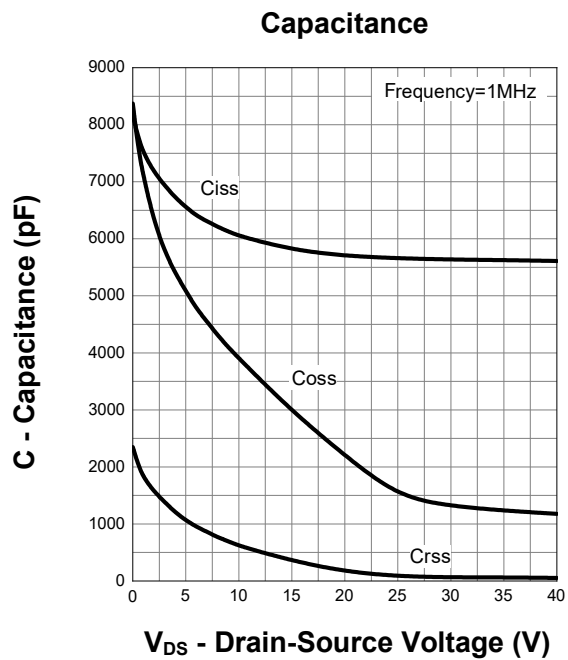
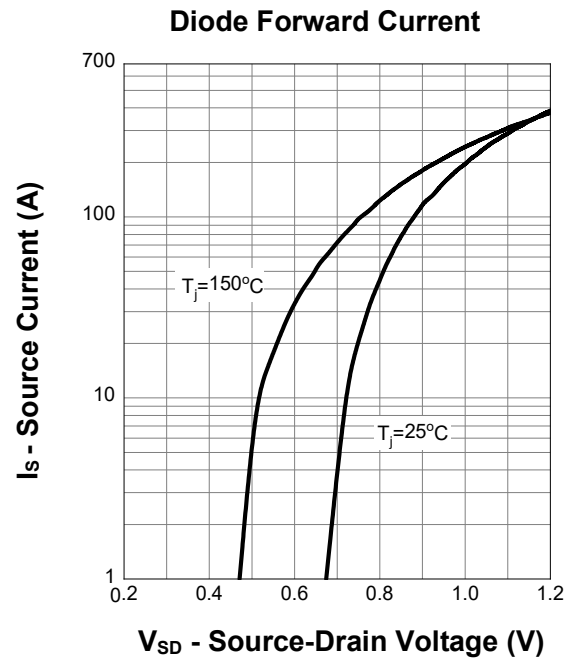
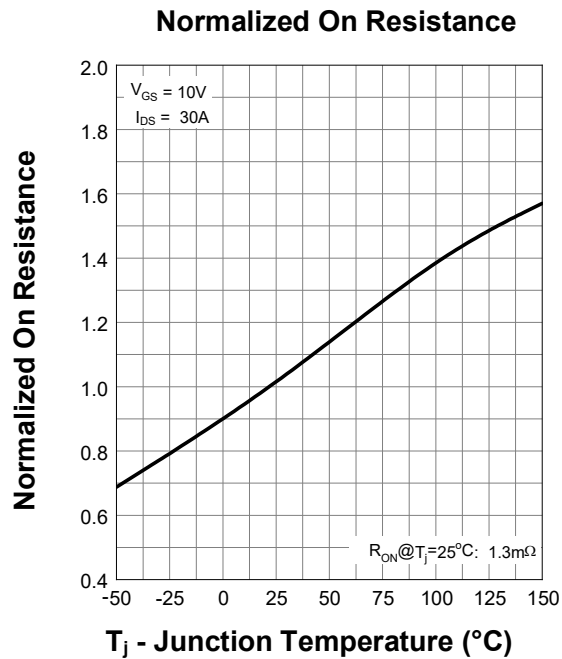
Transient Thermal Impedance



7. Typical Characteristics (cont.)

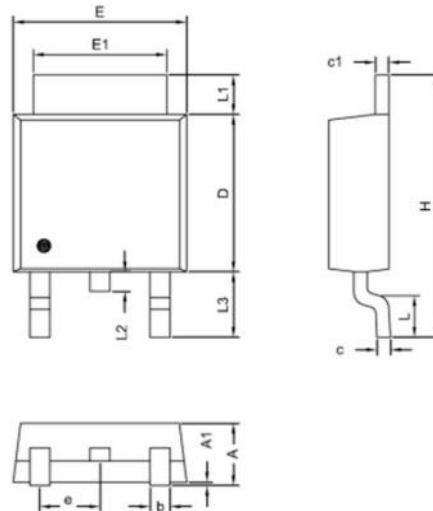


7. Typical Characteristics (cont.)



8.Package Dimensions

TO-252-3L



SYMBOL	Unit : mm		Unit : inch	
	MIN	MAX	MIN	MAX
A	2.080	2.500	0.082	0.098
A1	0.000	0.250	0.000	0.010
D	5.300	6.400	0.209	0.252
E	6.100	6.850	0.240	0.270
E1	4.676	5.650	0.184	0.222
c	0.400	0.650	0.016	0.026
c1	0.400	0.650	0.016	0.026
b	0.500	1.000	0.020	0.039
e	2.090	2.500	0.082	0.098
L	1.000	1.800	0.039	0.071
L1	0.700	1.800	0.028	0.071
L2	0.500	1.200	0.020	0.047
L3	2.400	3.070	0.094	0.121
H	9.000	10.700	0.354	0.421

Note : Dimension D and E1 do not include mold flash or protrusions.

Mold flash or protrusions shall not exceed 0.25mm(10 mils).