

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- Surface-mounted package
- Advanced trench cell design
- Extremely low threshold voltage

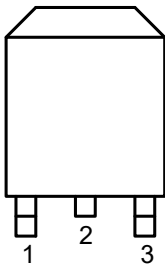
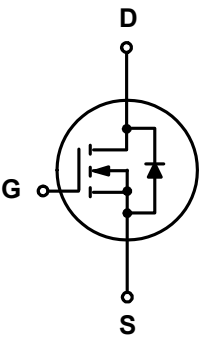
1.2 Applications

- Portable appliances
- High speed switch
- Battery management

1.3 Quick reference

- $BV \geq 150\text{ V}$
- $P_{tot} \leq 2\text{ W}$
- $I_D \leq 5\text{ A}$
- $R_{DS(ON)} \leq 330\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- $R_{DS(ON)} \leq 400\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

2. Pin Description

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


3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{DS}	Drain-Source Voltage	T _A = 25 °C	-	150	V
V _{GS}	Gate-Source Voltage	T _A = 25 °C	-	± 25	V
I _D *	Drain Current (DC)	T _A = 25 °C, V _{GS} = 10 V	-	5	A
		T _A = 100 °C, V _{GS} = 10 V	-	3.3	A
I _{DM} **	Drain Current (Pulsed)	T _A = 25 °C, V _{GS} = 10 V	-	15	A
P _{tot}	Total Power Dissipation	T _A = 25 °C	-	2	W
T _{stg}	Storage Temperature		- 55	150	°C
T _J	Junction Temperature		-	150	°C
I _S	Diode Forward Current	T _A = 25 °C	-	5	A
R _{θJA} *	Thermal Resistance- Junction to Ambient		-	37	°C / W

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
UP380RN15K	

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP380RN15K	TO252			2500	

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
B _V DSS	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	150	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	1	-	3	V
I _{DSS}	Drain Leakage Current	V _{DS} = 120 V, V _{GS} = 0V	-	-	1	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 25 V, V _{DS} = 0 V	-	-	± 100	nA
R _{DS(ON)} ^a	On-State Resistance	V _{GS} = 10 V, I _{DS} = 1 A	-	295	330	m Ω
		V _{GS} = 4.5 V, I _{DS} = 0.5 A	-	335	400	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 1 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} = 1 A, dI _{SD} /dt = 100 A/μs	-	29	-	nS
Q _{rr}	Reverse Recovery Charge		-	35	-	nC
Dynamic Characteristics^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 75 V Frequency = 1 MHz	-	164	-	pF
C _{oss}	Output Capacitance		-	17	-	
C _{rss}	Reverse Transfer Capacitance		-	5.3	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 75 V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 75 Ω, I _{DS} = 1 A	-	3.3	-	nS
t _r	Turn-on Rise Time		-	2.8	-	
t _{d(off)}	Turn-off Delay Time		-	7.7	-	
t _f	Turn-off Fall Time		-	27	-	
Gate Charge Characteristics^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 75 V, I _{DS} = 1 A	-	3.8	-	nC
Q _{gs}	Gate-Source Charge		-	1.4	-	
Q _{gd}	Gate-Drain Charge		-	0.2	-	

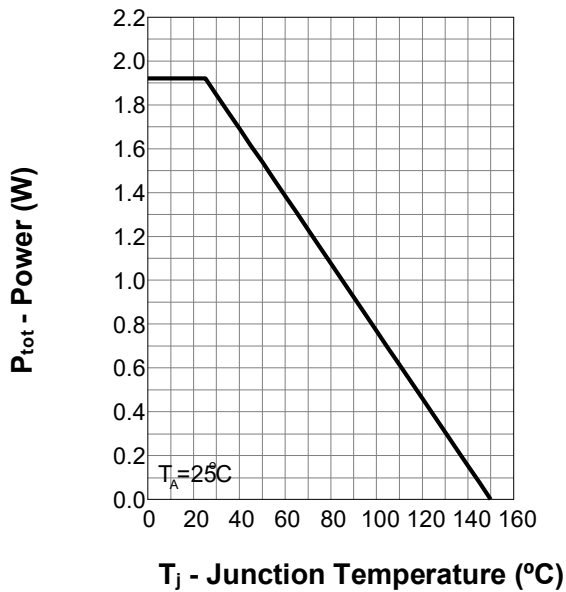
Notes :

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

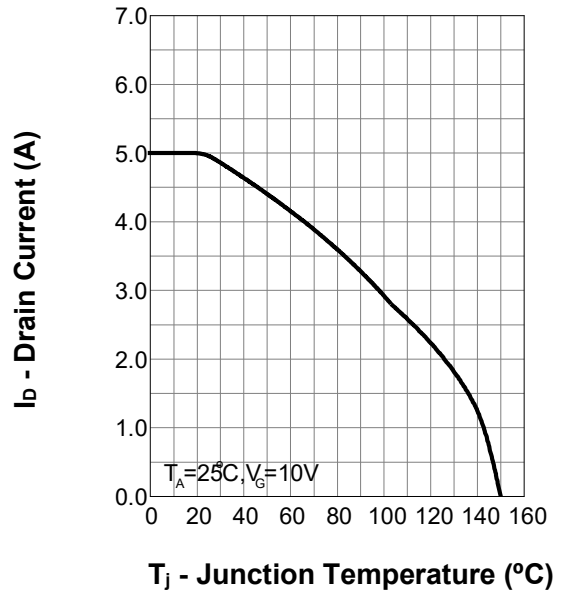
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

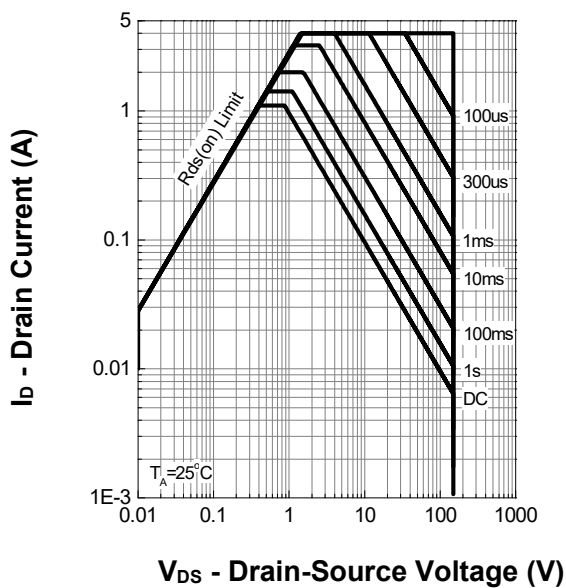
Power Dissipation



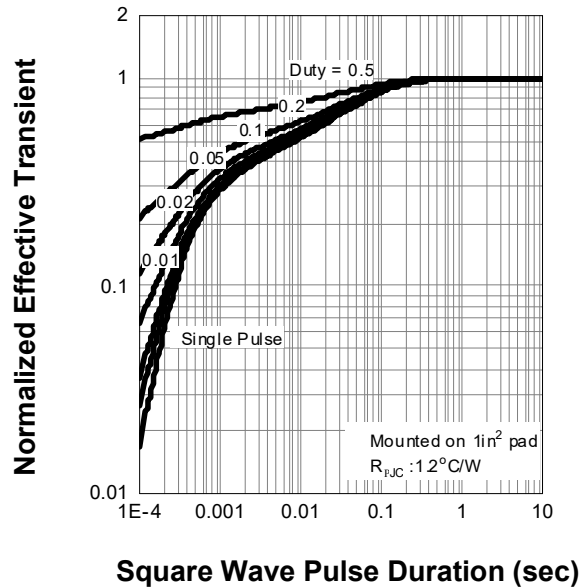
Current Capability



Safe Operation Area

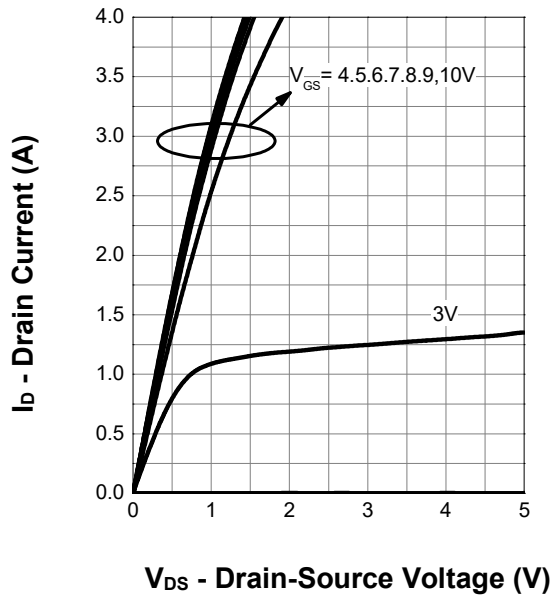


Thermal Transient Impedance

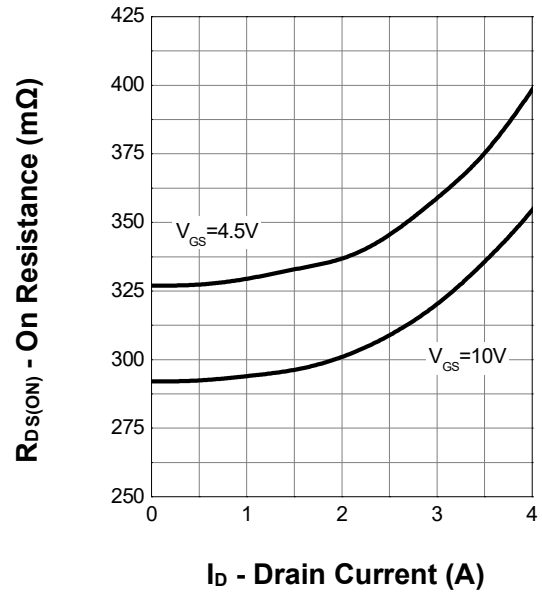


7. Typical Characteristics (cont.)

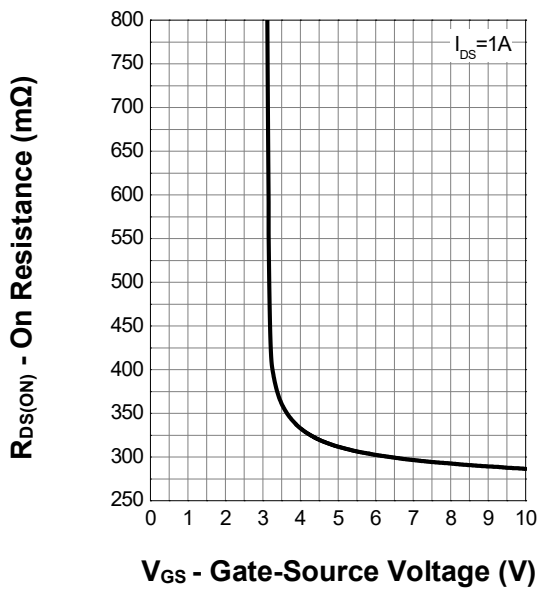
Output Characteristics



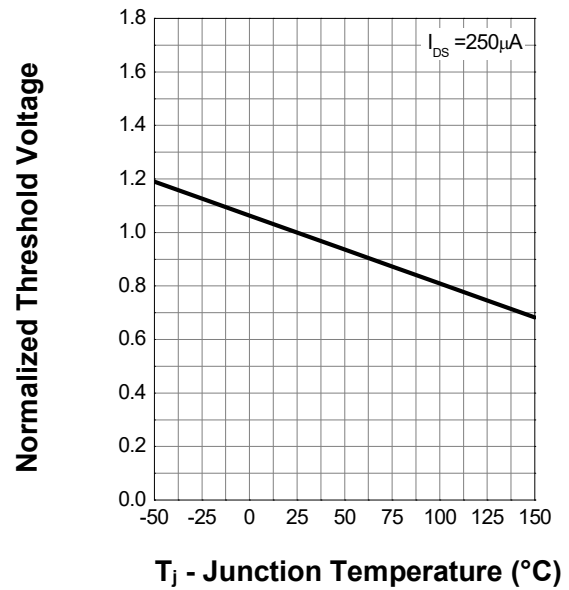
Drain-Source On Resistance



Transfer Characteristics

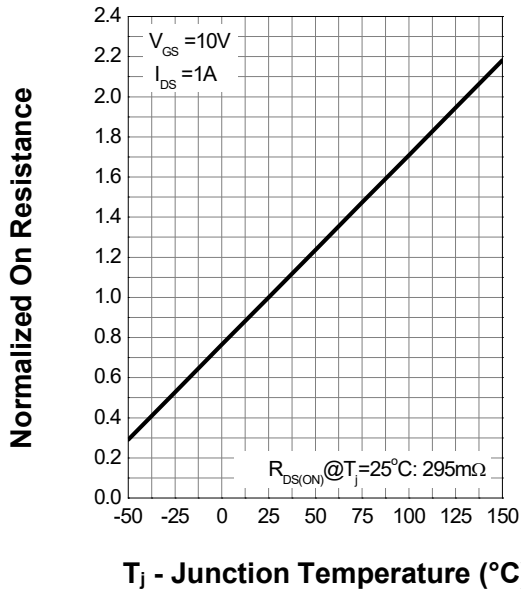


Normalized Threshold Voltage

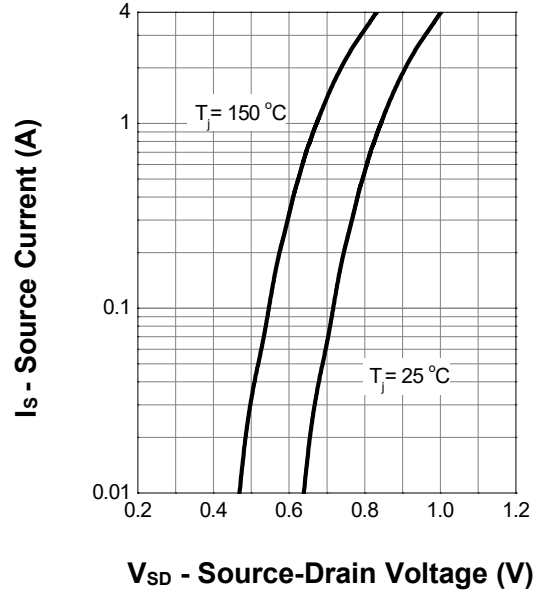


7. Typical Characteristics (cont.)

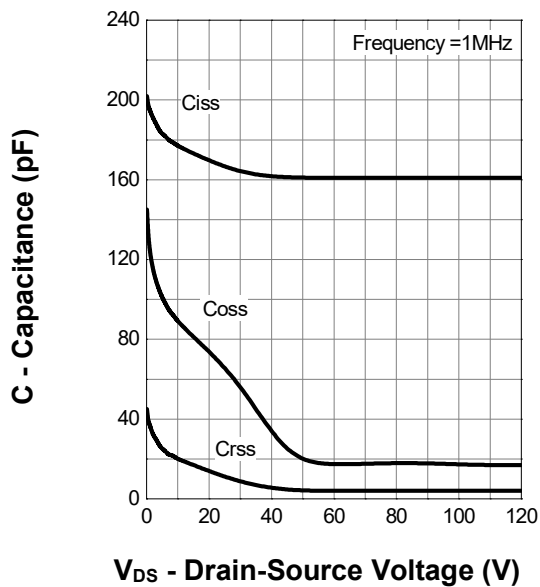
Normalized On Resistance



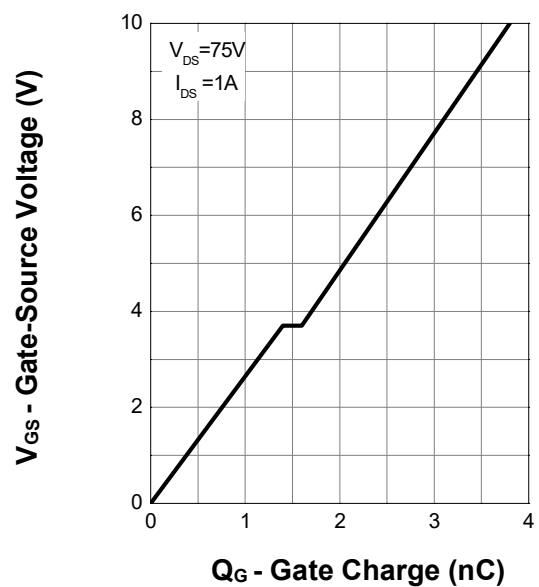
Current Diode Forward



Capacitance

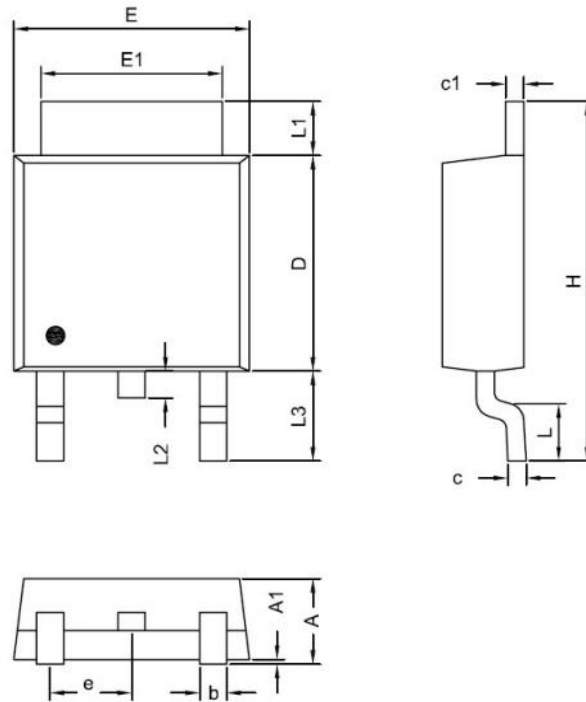


Gate Charge



8.Package Dimensions

TO252-3L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	2.19	2.38
A1	0.02	0.13
D	5.30	6.40
E	6.35	6.80
E1	5.20	5.50
c	0.40	0.60
c1	0.40	0.60
b	0.55	0.85
e	2.30 BCS	
L	1.00	1.80
L1	0.70	1.80
L2	0.70 BCS	
L3	2.40	2.80
H	9.20	10.40