P-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

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

1.2 Applications

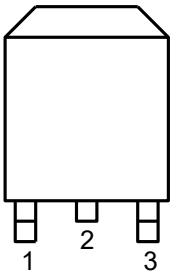
- ☑ Portable appliances
- ☑ High speed switch
- ☑ Battery management
- ☑ Low power DC to DC Converter

1.3 Quick reference

- ☑ BV ≧ -200 V
- ☑ P_{tot} ≦ 96 W
- ☑ I_D ≦ -12 A
- ☑ $R_{DS(ON)}$ ≦ 650 mΩ @ V_{GS} = - 10 V

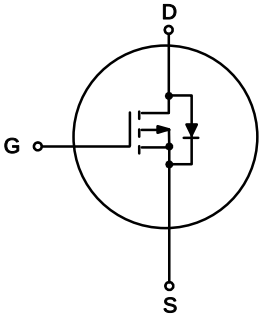
2. Pin Description

Pin	Description
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_A = 25 ℃	-	-200	V
V_{GS}	Gate-Source Voltage	T_A = 25 ℃	-	± 20	V
I_D*	Drain Current	T_A = 25 ℃, V_{GS} = -10 V	-	-12	A
I_D*	Drain Current	T_A = 100 ℃, V_{GS} = -10 V	-	-7	A
I_{DM}*,**	Pulsed Drain Current	T_A = 25 ℃, V_{GS} = -10 V	-	-36	A
P_{tot}*	Total Power Dissipation	T_A = 25 ℃	-	96	W
T_{stg}	Storage Temperature		- 55	150	℃
T_J	Junction Temperature		- 55	150	℃
I_S	Diode Forward Current	T_A = 25 ℃	-	-12	A
$R_{\theta JA}$*	Thermal Resistance- Junction to Ambient		-	50	℃ / W
$R_{\theta JC}$*	Thermal Resistance- Junction to Case		-	3.6	℃ / W

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
UP12P20K	**12P20 YWWXXX**

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP12P20K	**TO252**			**2500**	

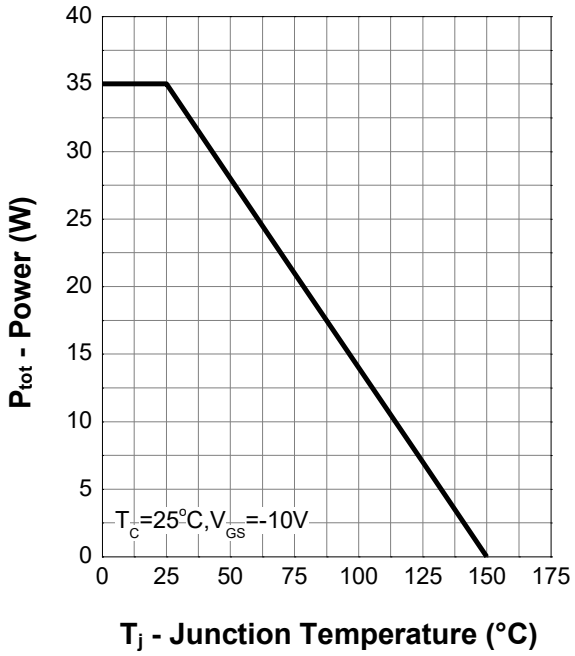
6. Electrical Characteristics (T_A = 25 ℃ Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = -250 μA	-200	-	-	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} = -160 V, V_{GS} = 0 V	-	-	1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	± 100	nA
$R_{DS(ON)}$[a]	On-State Resistance	V_{GS} = -10 V, I_{DS} = -5 A	-	-	650	mΩ
Diode Characteristics						
V_{SD}[a]	Diode Forward Voltage	I_{SD} = -5 A, V_{GS} = 0 V	-	-	-1.3	V
t_{rr}	Reverse Recovery Time	I_{SD} = -5 A, dI_{SD} / dt = 100 A / μs	-	17	-	nS
Q_{rr}	Reverse Recovery Charge		-	13	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = -160 V Frequency = 1 MHz	-	1210	-	pF
C_{oss}	Output Capacitance		-	170	-	
C_{rss}	Reverse Transfer Capacitance		-	45	-	
t_d(on)	Turn-on Delay Time	V_{DS} = -160 V, V_{GEN} = -10 V, R_G = 10 Ω, I_{DS} = -5 A	-	13.5	-	nS
t_r	Turn-on Rise Time		-	16	-	
t_d(off)	Turn-off Delay Time		-	52	-	
t_f	Turn-off Fall Time		-	25	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{GS} = -10 V, V_{DS} = -160 V, I_{DS} = -5 A	-	35	-	nC
Q_{gs}	Gate-Source Charge		-	6	-	
Q_{gd}	Gate-Drain Charge		-	15	-	

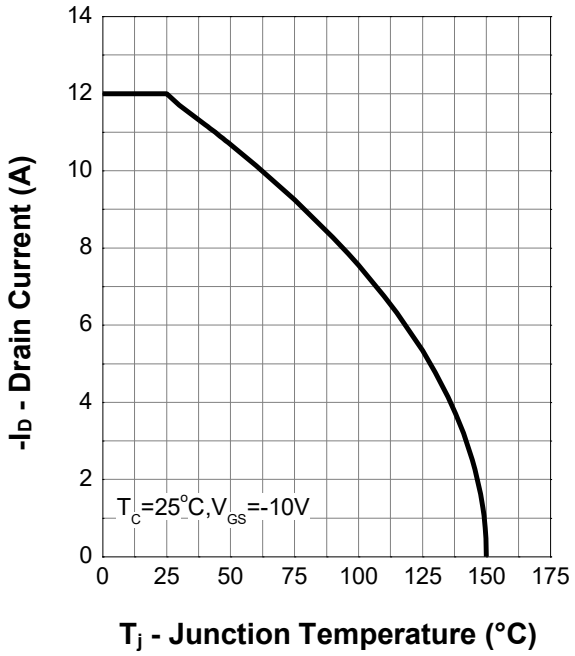
Notes： a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics (Cont.)

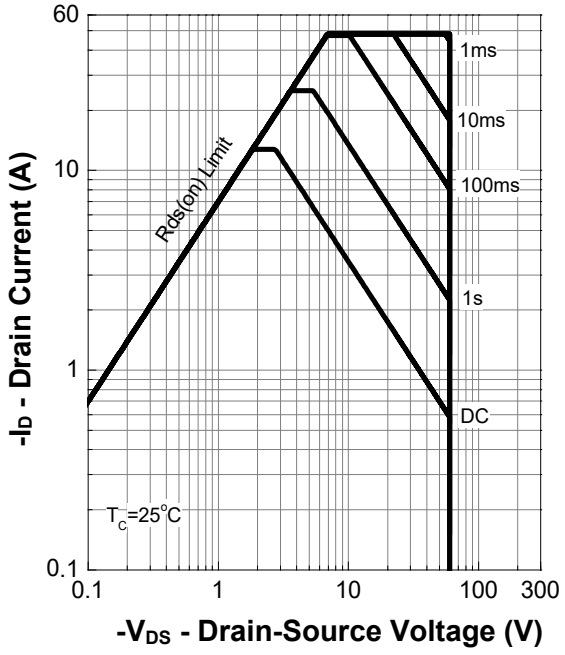
Power Capability



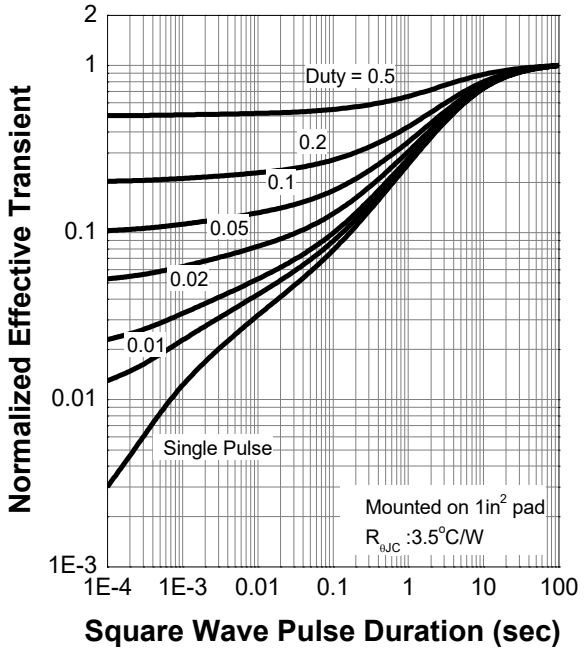
Current Capability



Safe Operatio. ea

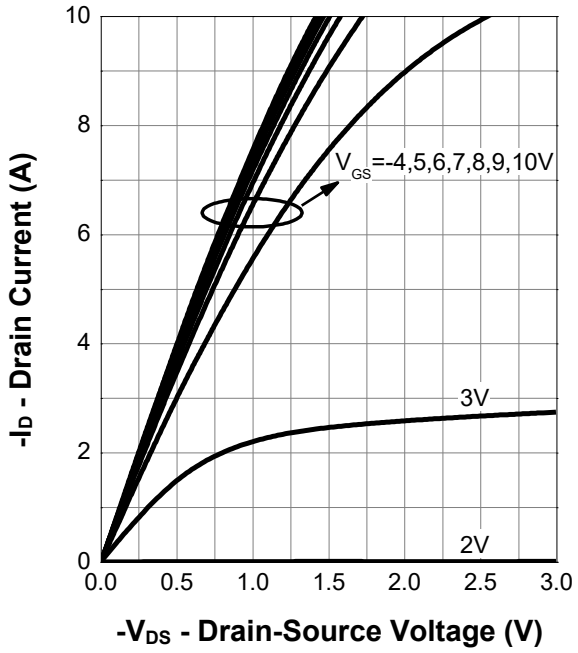


Transient Thermal Impedance

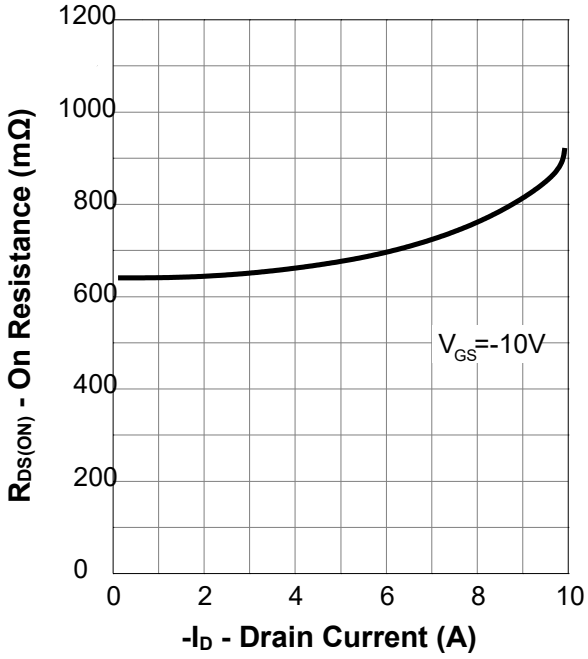


7. Typical Characteristics (Cont.)

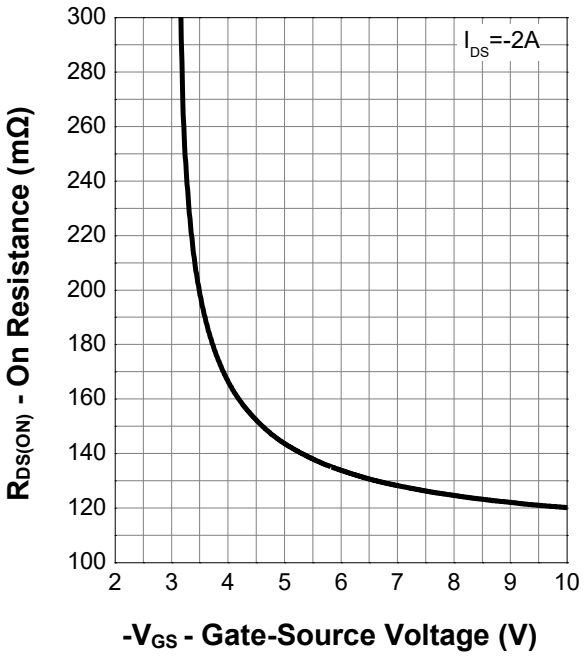
Output Characteristics



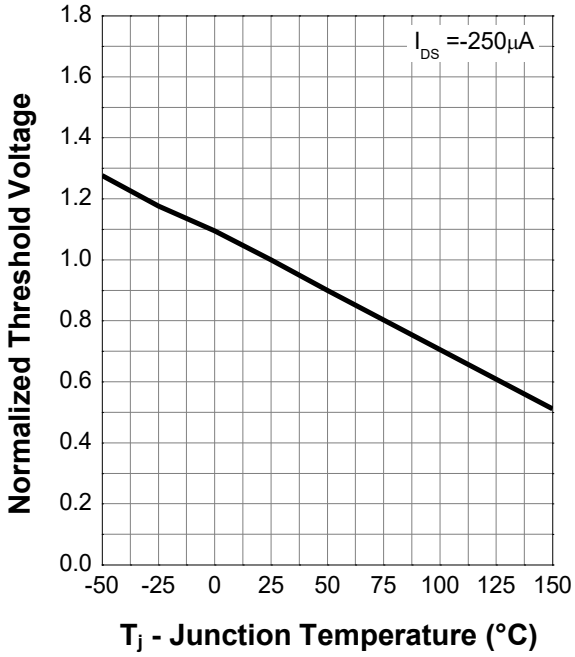
On Resistance



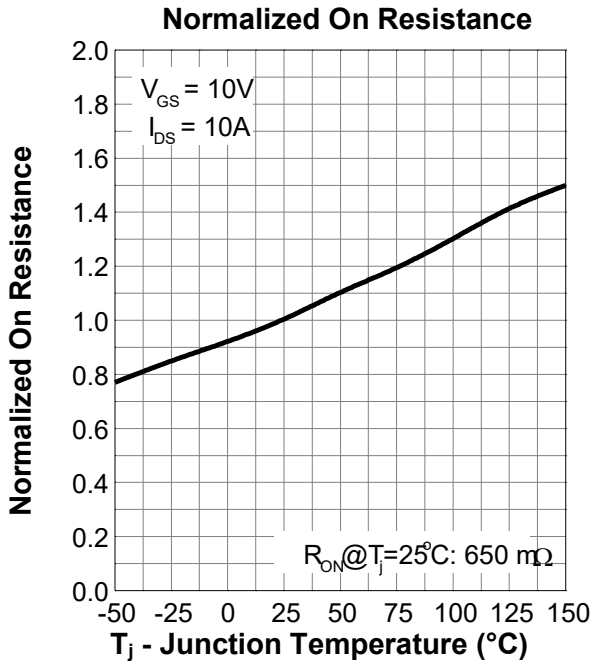
Transfer Characteristics

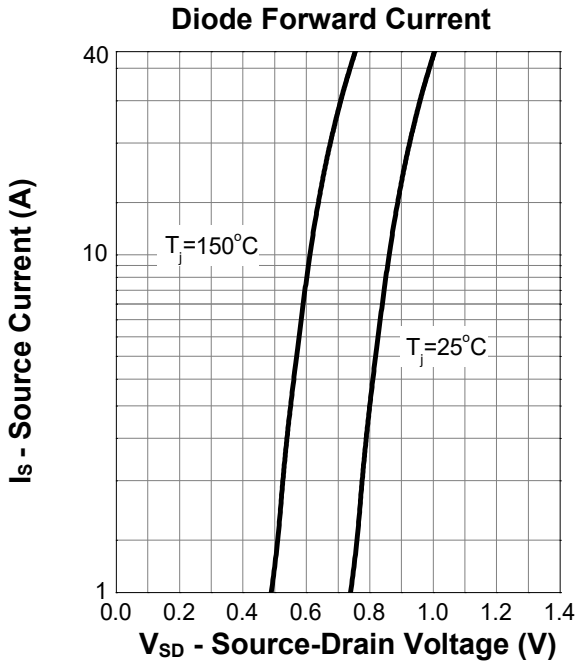


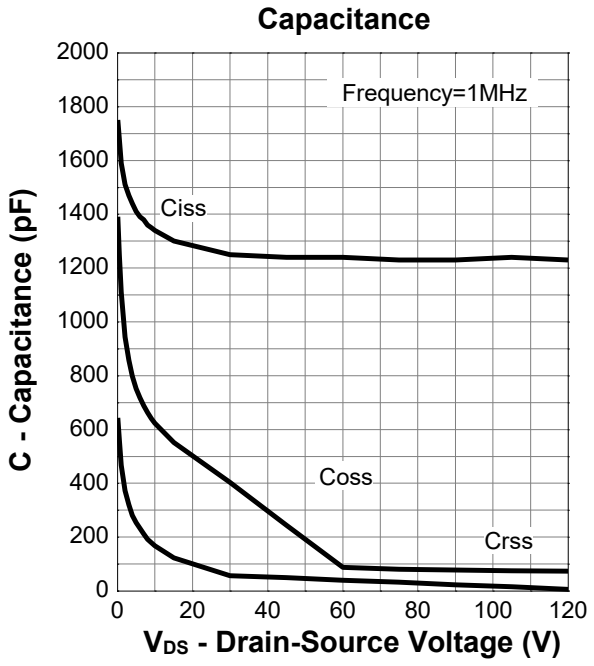
Normalized Threshold Voltage

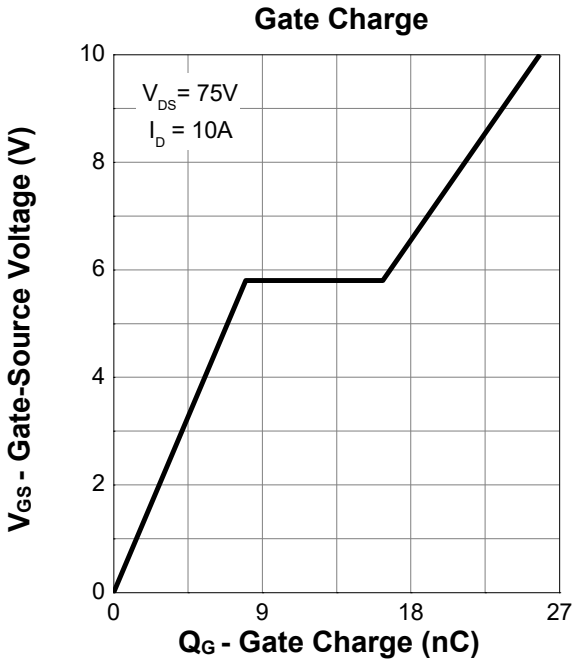


7. Typical Characteristics (cont.)









8.Package Dimensions

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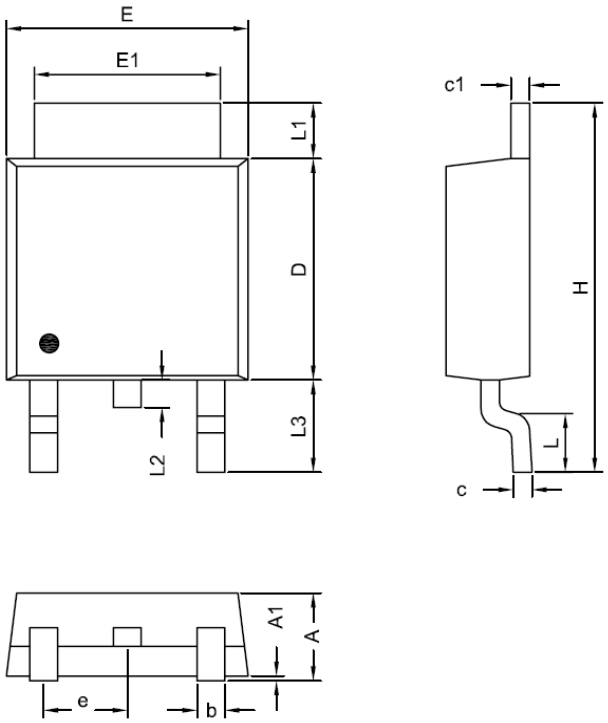

Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	2.19	2.38
A1	0.02	0.13
D	5.30	6.40
E	6.35	6.80
E1	5.20	5.50
c	0.40	0.60
c1	0.40	0.60
b	0.55	0.85
e	2.30 BCS	
L	1.00	1.80
L1	0.70	1.80
L2	0.70 BCS	
L3	2.40	2.80
H	9.20	10.40