

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ✓ Advanced trench cell design
- ✓ Low Thermal Resistance

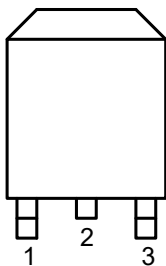
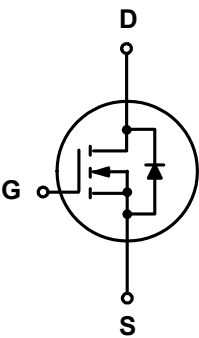
1.2 Applications

- ✓ Motor drivers
- ✓ DC - DC Converter

1.3 Quick reference

- ✓ $BV \geq 60 \text{ V}$
- ✓ $R_{DS(ON)} \leq 2.5 \text{ m}\Omega @ V_{GS} = 10 \text{ V}$
- ✓ $P_{tot} \leq 250 \text{ W}$
- ✓ $R_{DS(ON)} \leq 3.0 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$
- ✓ $I_D \leq 157 \text{ A}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 Top View TO263-3L	
2	Drain(D)		
3	Source(S)		

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	60	V
V_{GS}	Gate-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	± 20	V
$I_D^{*,***}$	Drain Current (DC)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	157	A
		$T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	131	A
$I_{DM}^{*,**}$	Drain Current (Pulsed)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	630	A
P_{tot}^*	Total Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	250	W
T_{stg}	Storage Temperature		- 55	150	$^{\circ}\text{C}$
T_J	Junction Temperature		-	150	$^{\circ}\text{C}$
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	157	A
E_{AS}^*	Single Pulsed Avalanche Energy	$V_{DD} = 50\text{ V}, L = 0.1\text{ mH}$	-	1058	mJ
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	42	$^{\circ}\text{C} / \text{W}$
$R_{\theta JC}^*$	Thermal Resistance- Junction to Case		-	0.5	

Notes :

- * Surface Mounted on 1 in² pad area, $t \leq 10\text{ sec}$
- ** Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- *** Limited by bonding wire

4. Marking Information

Product Name	Marking
UP020N06D	020N06 YWWXXX YWWXXX: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP020N06D	TO263			800	

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 _D = 250 μA	60	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	1.0	-	3.0	V
I _{DSS}	Zero Gate Voltage Source Current	V _{DS} = 48 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	Drain-Source On-State Resistance	V _{GS} = 10 V, I _D = 30 A	-	2.2	2.5	mΩ
	Drain-Source On-State Resistance	V _{GS} = 4.5 V, I _D = 20 A	-	2.7	3.0	mΩ
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 30A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} = 30A, dI _{SD} /dt = 100 A/μs	-	29	-	nS
Q _{rr}	Reverse Recovery Charge		-	26	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 30 V Frequency = 1 MHz	-	15922	-	pF
C _{oss}	Output Capacitance		-	552	-	
C _{rss}	Reverse Transfer Capacitance		-	237	-	
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 _D = 30 A	-	23	-	nS
t _r	Turn-on Rise Time		-	68	-	
t _{d(off)}	Turn-off Delay Time		-	214	-	
t _f	Turn-off Fall Time		-	119	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 30 V, I _{DS} = 30A	-	262	-	nC
Q _{gs}	Gate-Source Charge		-	59	-	
Q _{gd}	Gate-Drain Charge		-	31	-	

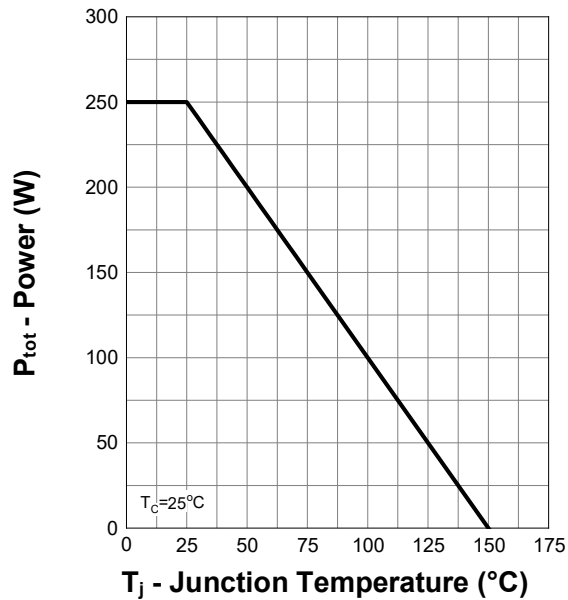
Notes :

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

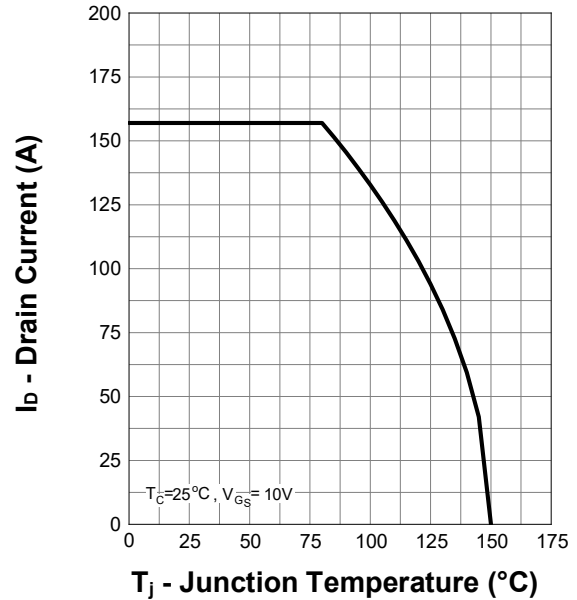
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

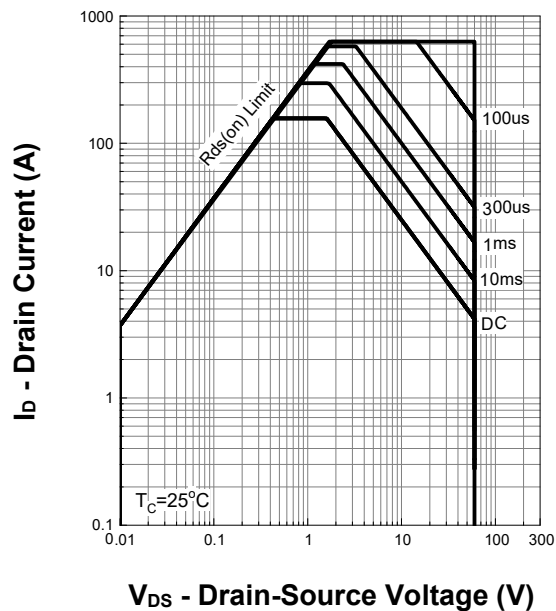
Power Capability



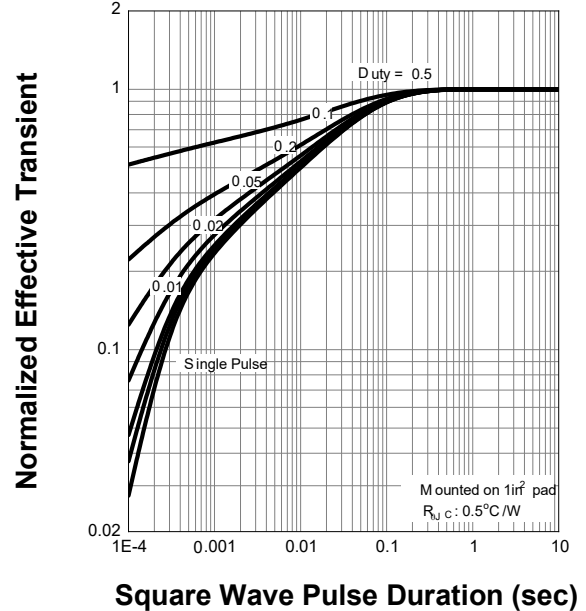
Current Capability



Safe Operating Area

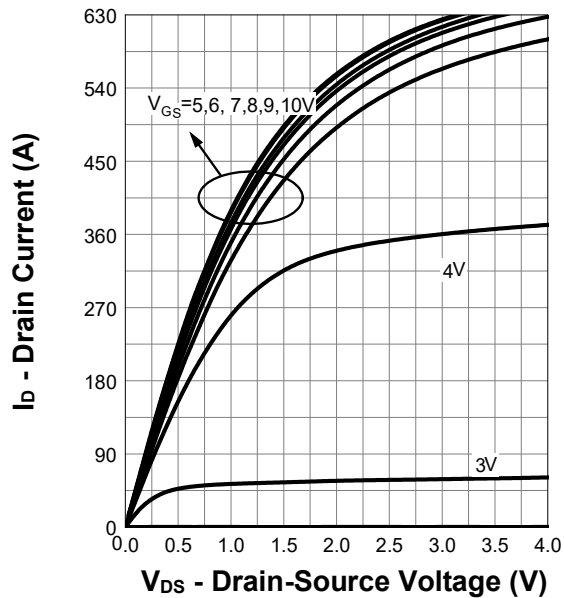


Transient Thermal Impedance

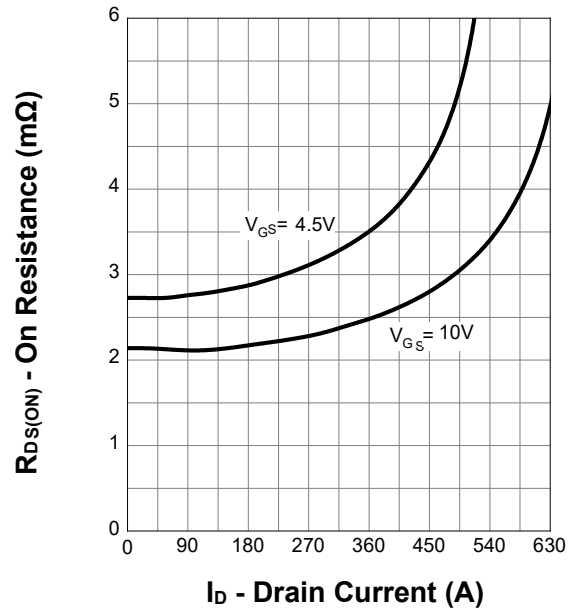


7. Typical Characteristics (cont.)

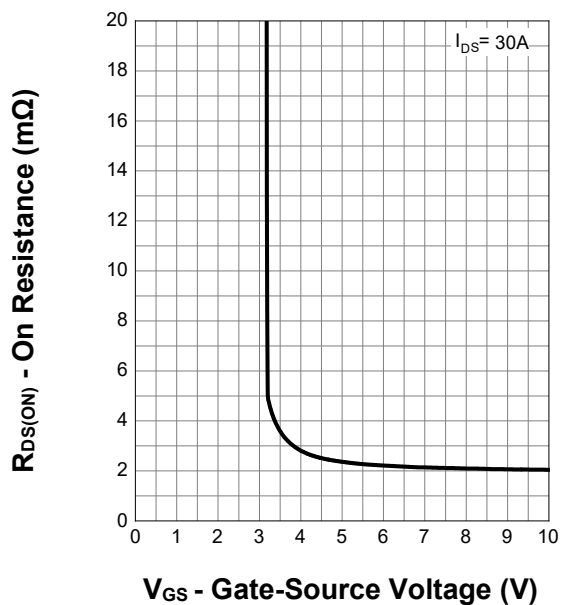
Output Characteristics



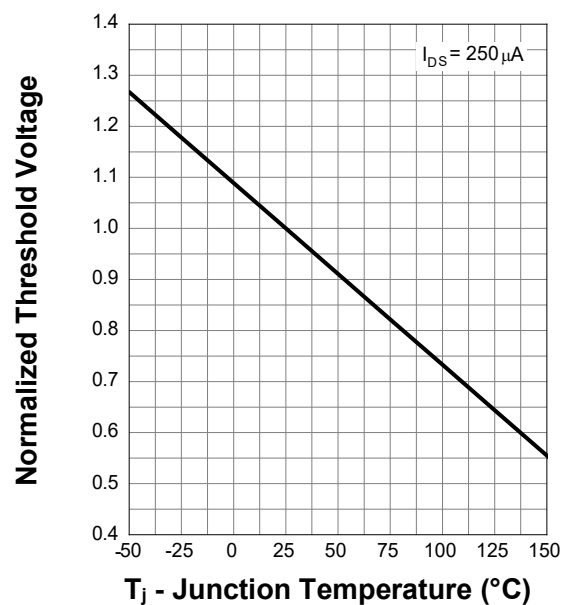
On Resistance



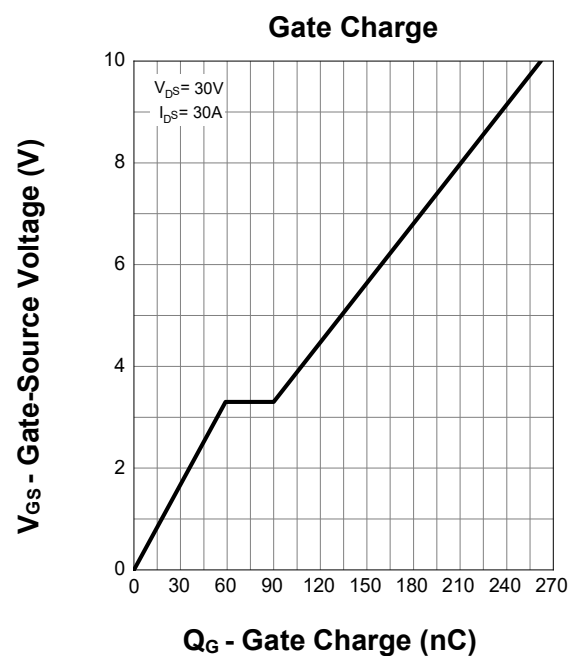
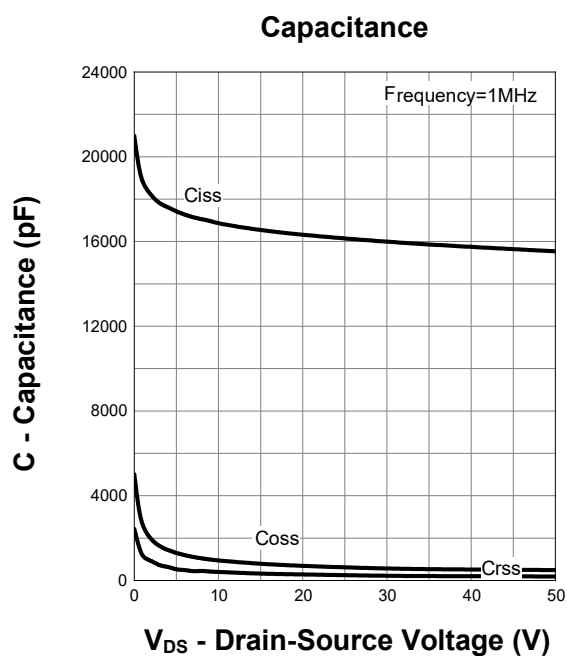
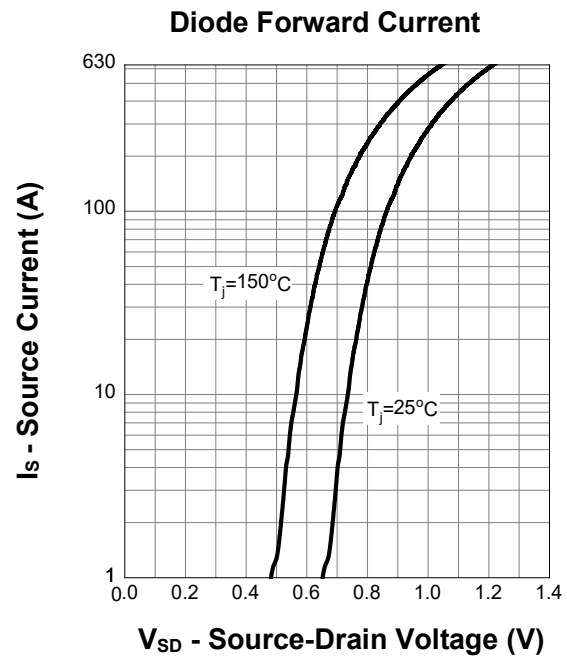
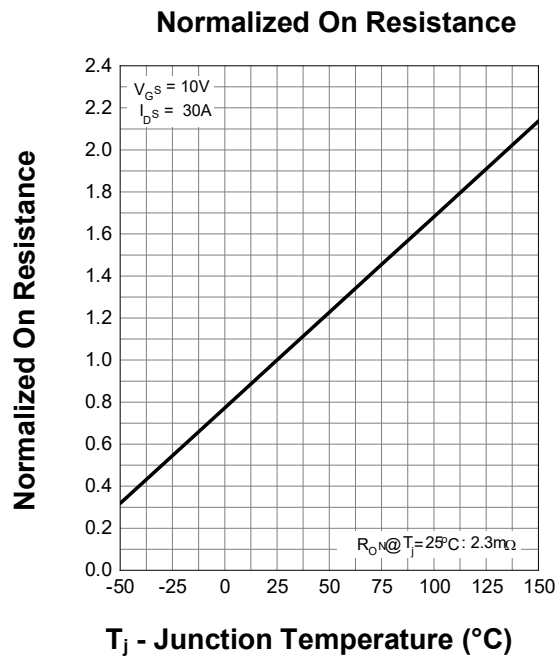
Transfer Characteristics



Normalized Threshold Voltage

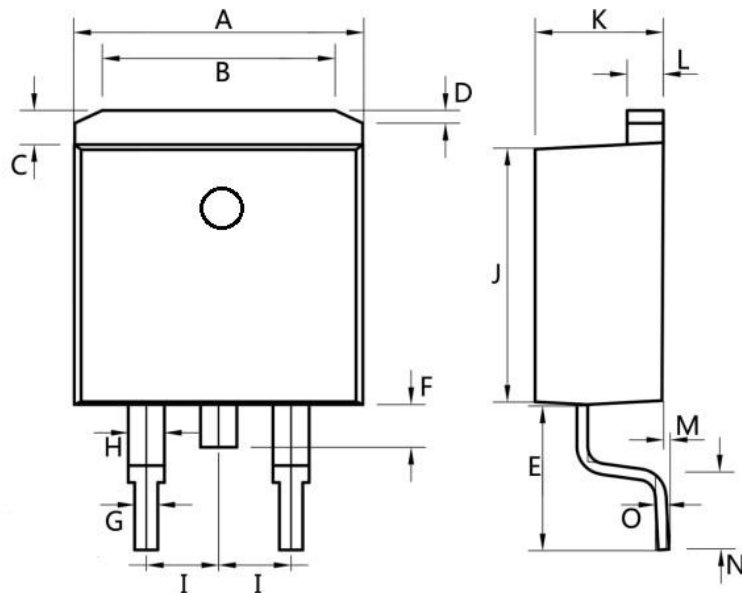


7. Typical Characteristics (cont.)



8. Package Dimensions

TO263-3L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	9.8	10.2
B	6.1	6.7
C	1.1	1.4
D	0.5	1.0
E	4.6	5.0
F	1.4	1.6
G	0.7	0.9
H	1.17	1.37
I	Typ2.54	
J	9	9.2
K	4.3	4.7
L	1.25	1.35
M	0.02	0.23
N	2.2	2.8
O	0.45	0.55
All Dimensions in millimeter		