

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Advanced trench cell design
- ☒ Low Thermal Resistance

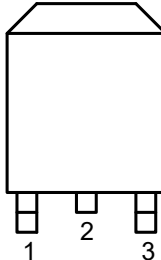
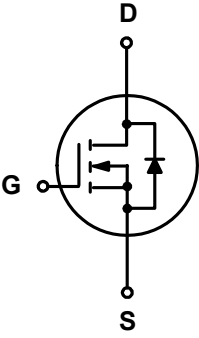
1.2 Applications

- ☒ Motor drivers
- ☒ DC - DC Converter

1.3 Quick reference

- ☒ $BV \geq 40\text{ V}$
- ☒ $P_{tot} \leq 250\text{ W}$
- ☒ $I_D \leq 180\text{ A}$
- ☒ $R_{DS(ON)} \leq 1.6\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ☒ $R_{DS(ON)} \leq 2.2\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 Top View TO-263-3L	
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	-	177	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	-	250	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
I _{AS}	Single Pulsed Avalanche Current	V _{DD} =40V , L=0.1mH	-	130	A
E _{AS}	Single Pulsed Avalanche Energy	V _{DD} =40V , L=1.0mH	-	1512	mJ
R _{θJA} ^{**}	Thermal Resistance- Junction to Ambient		-	42	°C/W
R _{θJC} ^{**}	Thermal Resistance- Junction to Case		-	0.5	

Notes :

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

4. Marking Information

Product Name	Marking
UP010N04D	010N04 YWWXXX YWWXXX: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP010N04D	TO263			800	

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

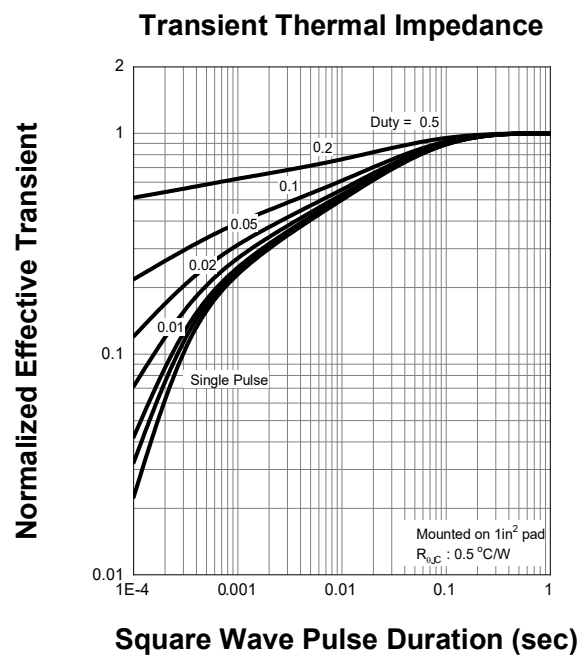
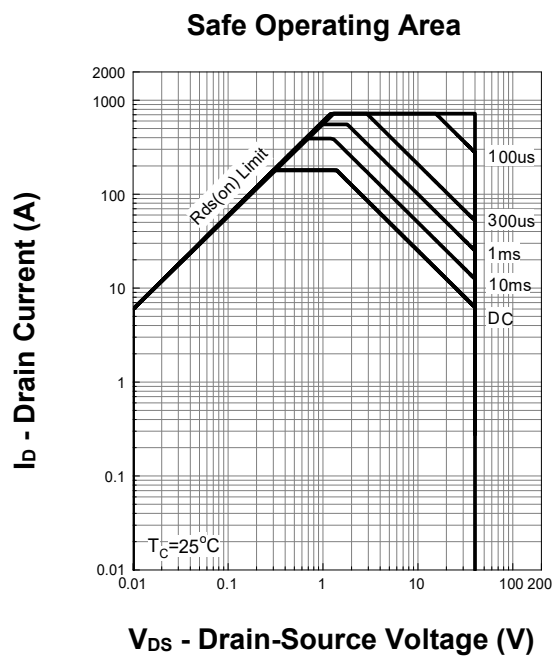
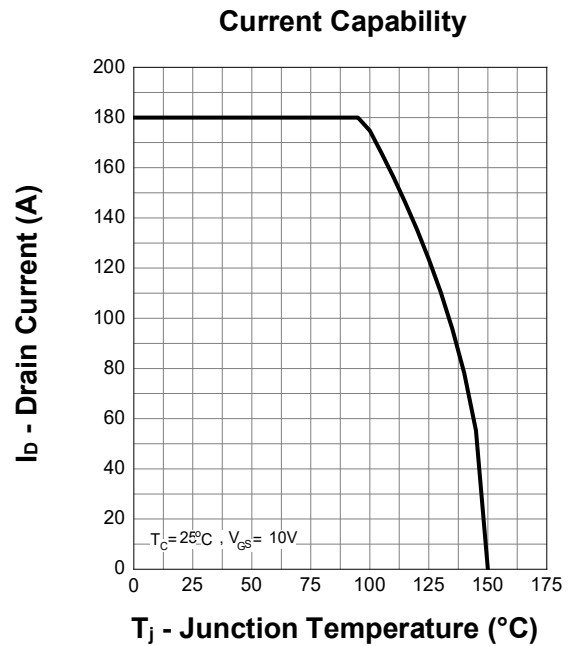
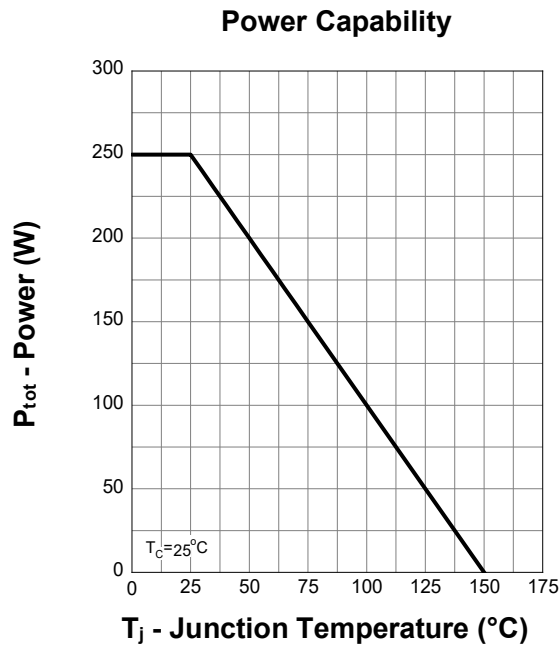
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	1	-	2	V
I _{DSS}	Drain Leakage Current	V _{DS} = 32 V, V _{GS} = 0 V	-	-	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	-	1.4	1.6	m Ω
		V _{GS} = 4.5 V, I _{DS} = 20 A	-	1.8	2.2	
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	-	34	-	nS
Q _{rr}	Reverse Recovery Charge		-	25	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V Frequency = 1 MHz	-	14308	-	pF
C _{oss}	Output Capacitance		-	1036	-	
C _{rss}	Reverse Transfer Capacitance		-	308	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 20 V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 0.67 Ω, I _{DS} = 30 A	-	25	-	nS
t _r	Turn-on Rise Time		-	110	-	
t _{d(off)}	Turn-off Delay Time		-	190	-	
t _f	Turn-off Fall Time		-	126	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} = 20 V, V _{GS} = 10 V, I _{DS} = 30 A	-	238	-	nC
Q _{gs}	Gate-Source Charge		-	53	-	
Q _{gd}	Gate-Drain Charge		-	32	-	

Notes :

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

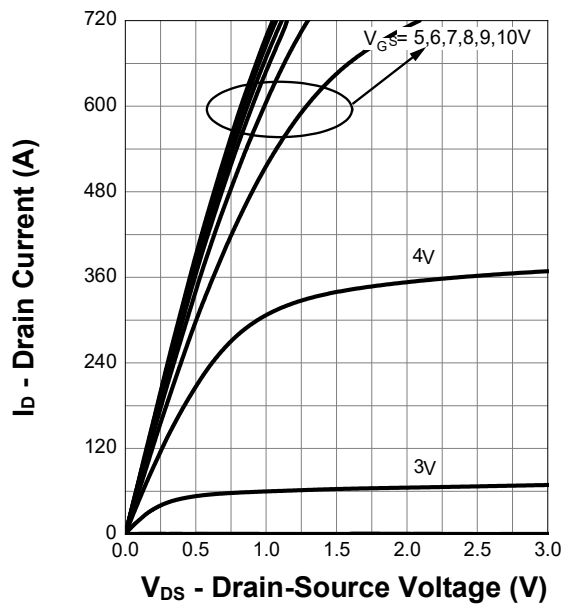
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

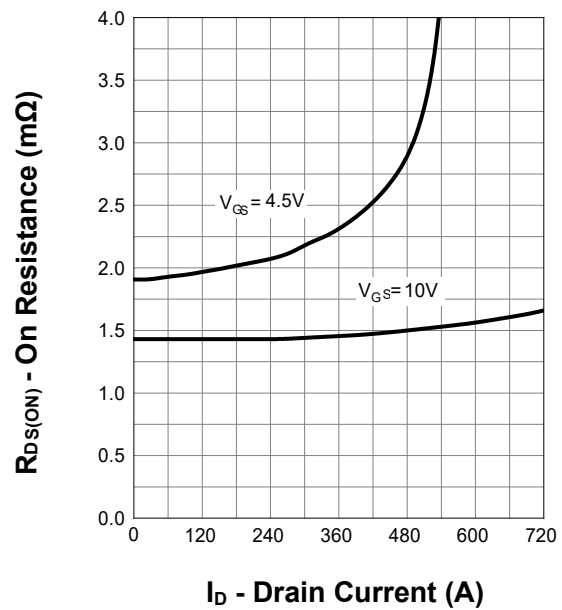


7. Typical Characteristics (cont.)

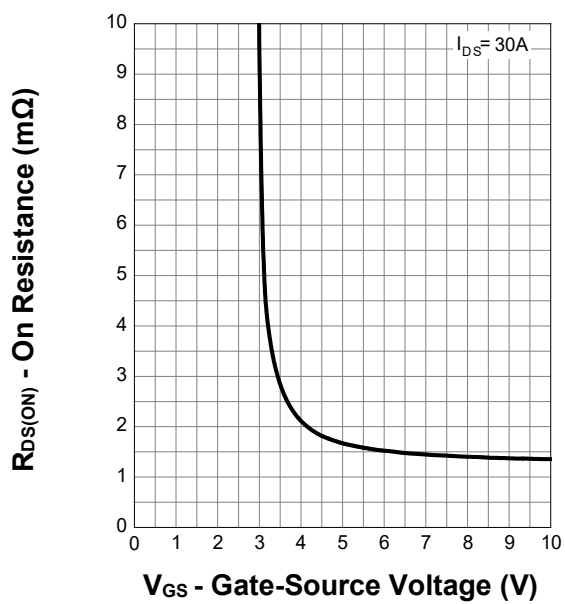
Output Characteristics



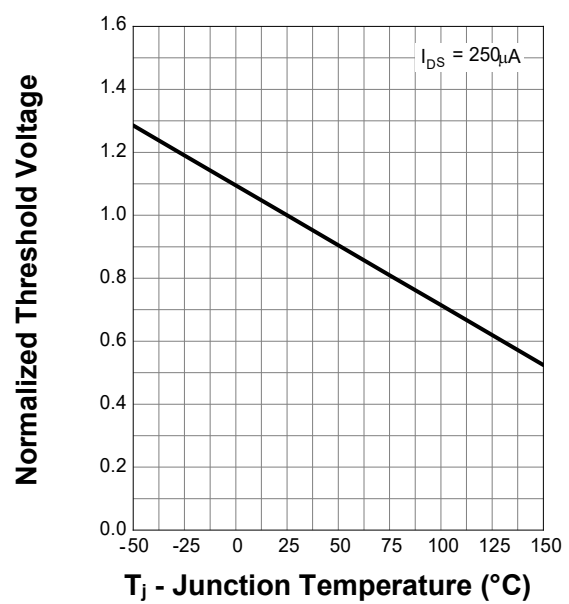
On Resistance



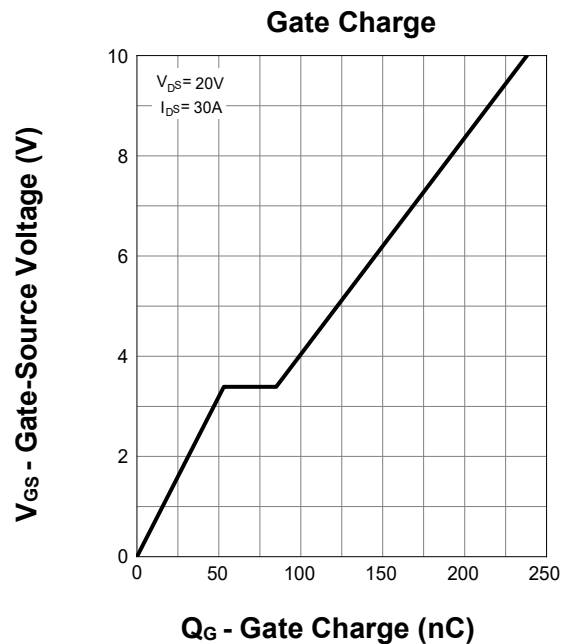
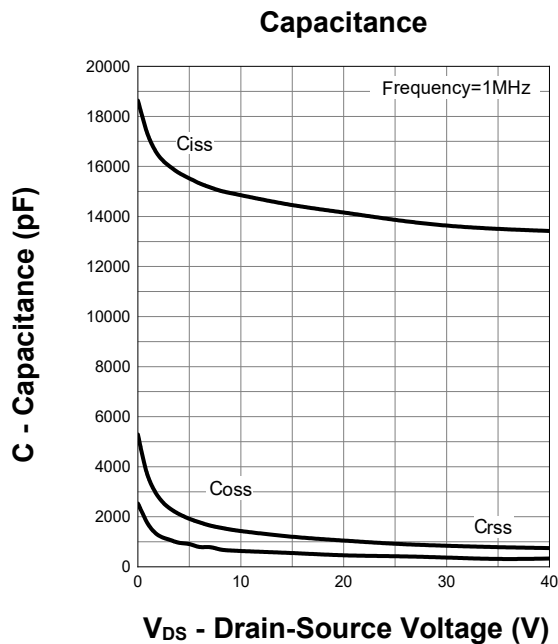
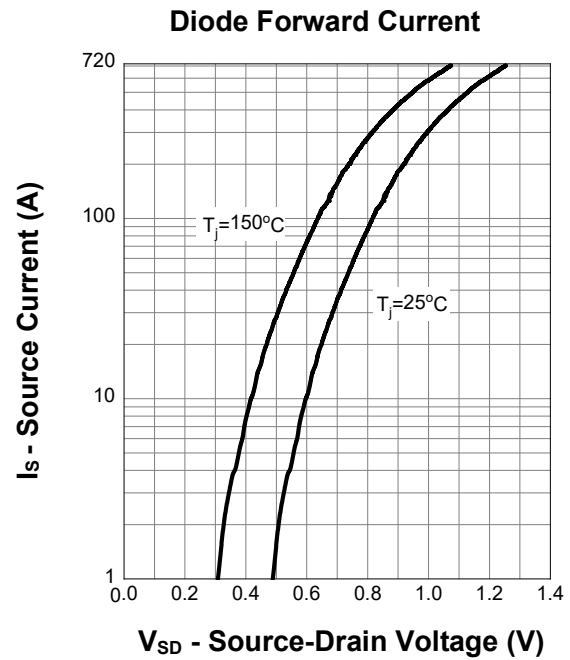
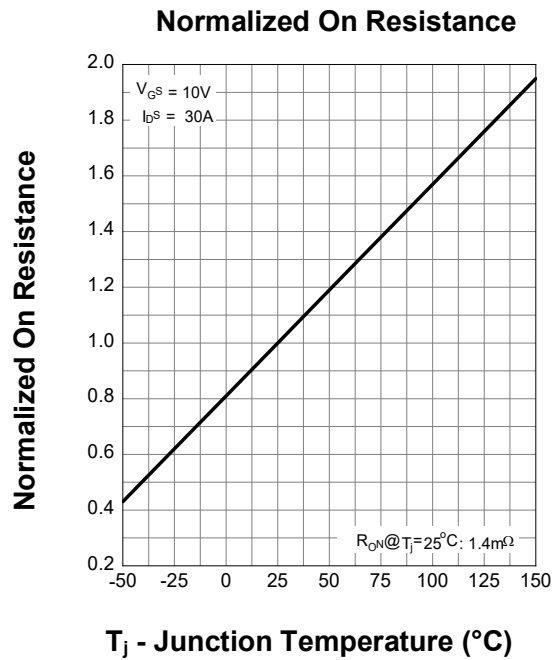
Transfer Characteristics



Normalized Threshold Voltage

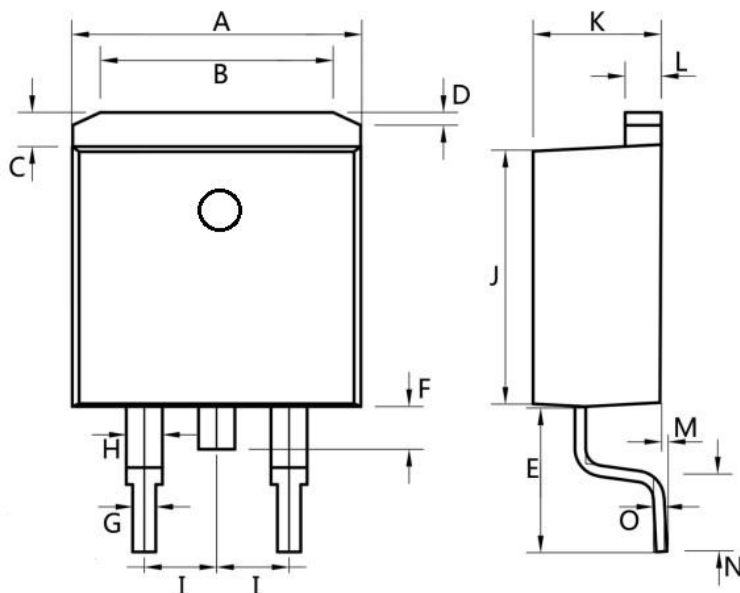


7. Typical Characteristics (cont.)



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		