

P-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Surface-mounted package
- ☒ Low gate charge

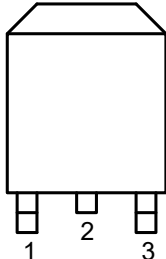
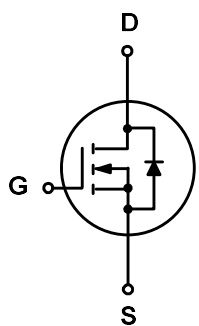
1.2 Applications

- ☒ Motor driver appliances
☒ Adapter appliances
- ☒ High power inverter system

1.3 Quick reference

- ☒ $BV \geq -60\text{ V}$
☒ $P_{tot} \leq 50\text{ W}$
☒ $I_D \leq -50\text{ A}$
- ☒ $R_{DS(ON)} \leq 20\text{ m}\Omega @ V_{GS} = -10\text{ V}$
☒ $R_{DS(ON)} \leq 28\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$

2. Pin Description

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

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{DS}	Drain-Source Voltage	T _C = 25 °C	- 60	-	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	-	- 50	A
		T _C = 100 °C, V _{GS} = - 10 V	-	- 24	A
I _{DM} *,**,***	Drain Current (Pulsed)	T _C = 25 °C, V _{GS} = - 10 V	-	- 120	A
P _{tot}	Drain power dissipation	T _C = 25 °C	-	50	W
T _{stg}	Storage Temperature		-55	150	°C
T _J	Junction Temperature		-	150	°C
I _S	Diode Forward Current	T _C = 25 °C	-	- 50	A
E _{AS} *	Single Pulsed Avalanche Energy	V _{DD} = 50 V , L= 1.0 mH	-	276	mJ
R _{θJA} *	Thermal Resistance- Junction to Ambient		-	37	°C/W
R _{θJC} *	Thermal Resistance- Junction to Case		-	0.75	

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
N50P06D	50P06 YWWXXX YWW: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
N50P06D	TO263			800	

6. Electrical Characteristics ($T_A=25\text{ }^{\circ}\text{C}$ 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	- 60	-	-	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} = - 48 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} = - 15 A	-	18	20	mΩ
		V _{GS} = - 4.5 V, I _{DS} = - 10 A	-	25	28	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = - 15 A, V _{GS} = 0 V	-	-	- 1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} = - 15 A, dI _{SD} / dt = 100 A / μs	-	23	-	nS
Q _{rr}	Reverse Recovery Charge		-	23	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = - 30 V Frequency = 1 MHz	-	4584	-	pF
C _{oss}	Output Capacitance		-	178	-	
C _{rss}	Reverse Transfer Capacitance		-	133	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = - 30 V, V _{GEN} = - 10 V, R _G = 3.9 Ω, R _L = 2 Ω, I _{DS} = - 15 A	-	66	-	nS
t _r	Turn-on Rise Time		-	101	-	
t _{d(off)}	Turn-off Delay Time		-	465	-	
t _f	Turn-off Fall Time		-	205	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} = - 30 V, V _{GS} = - 10 V, I _{DS} = - 15 A	-	72	-	nC
Q _{gs}	Gate-Source Charge		-	19	-	
Q _{gd}	Gate-Drain Charge		-	9.8	-	

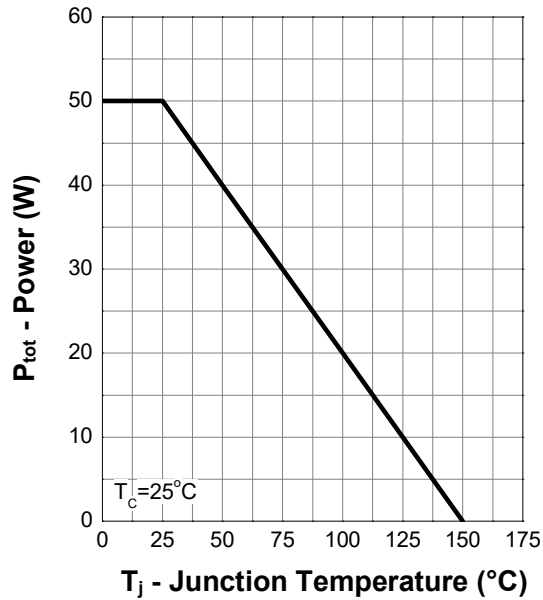
Notes :

a : Pulse test ; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

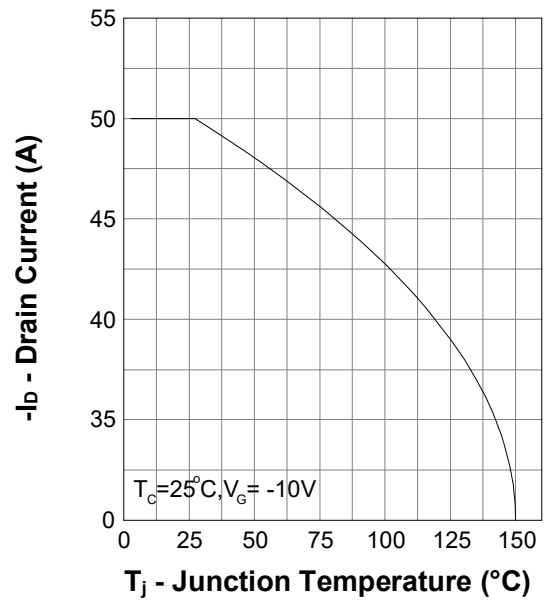
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics (Cont.)

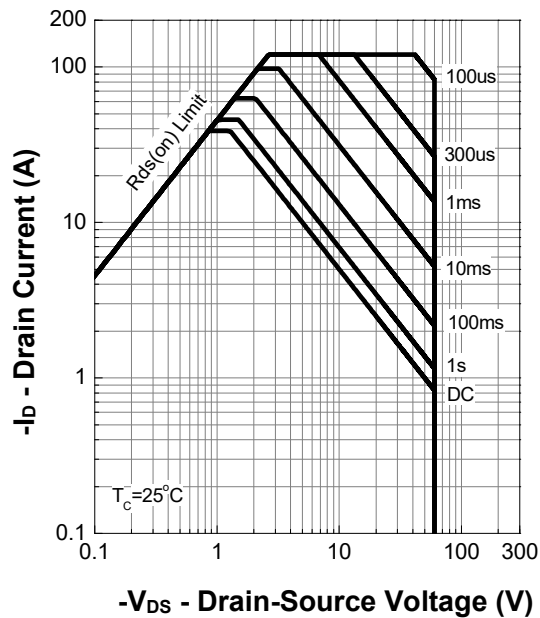
Power Capability



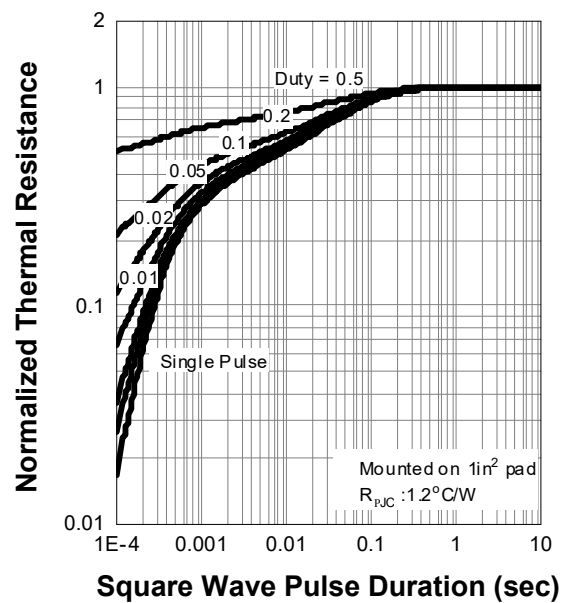
Current Capability



Safe Operation Area

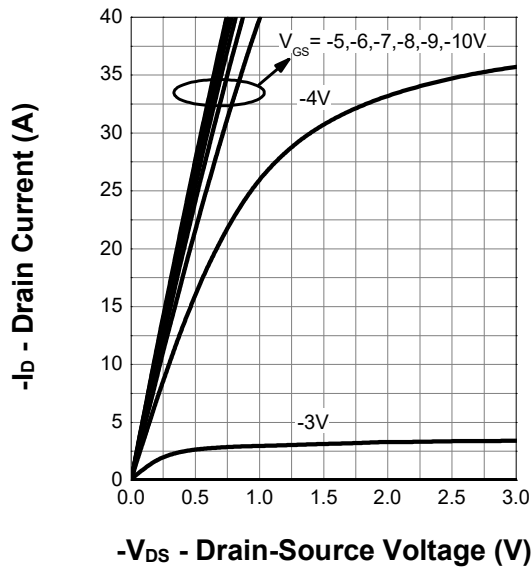


Transient Thermal Impedance

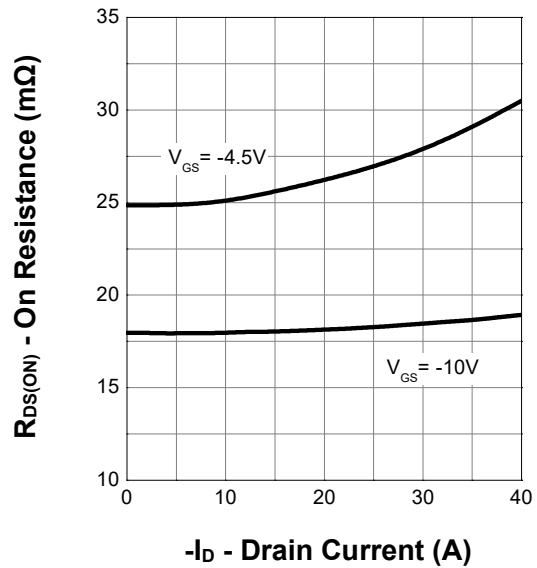


7. Typical Characteristics (Cont.)

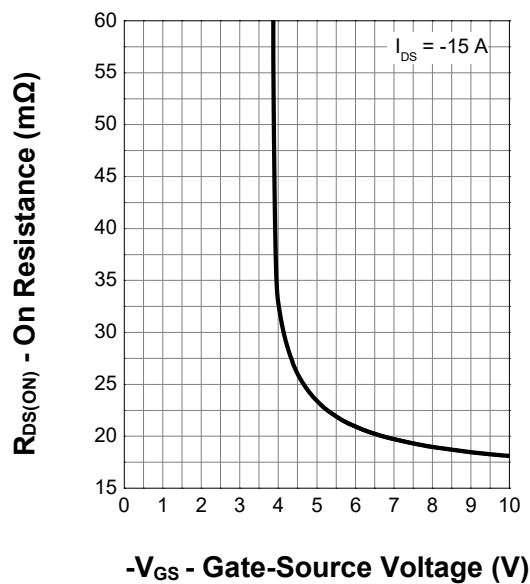
Output Characteristics



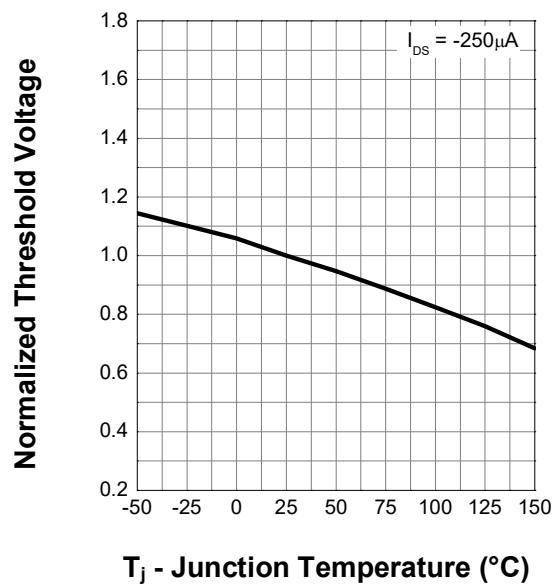
Drain-Source On Resistance



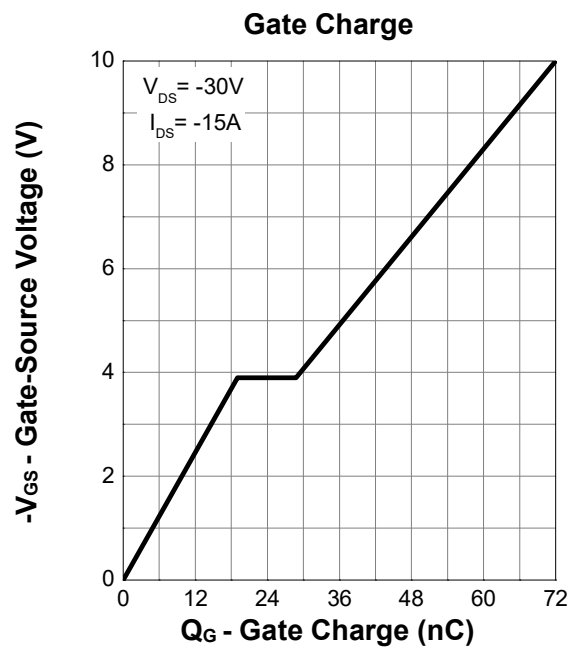
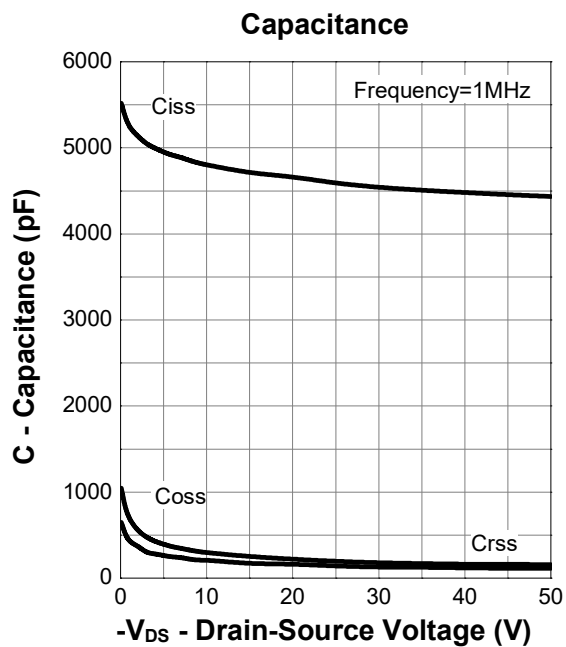
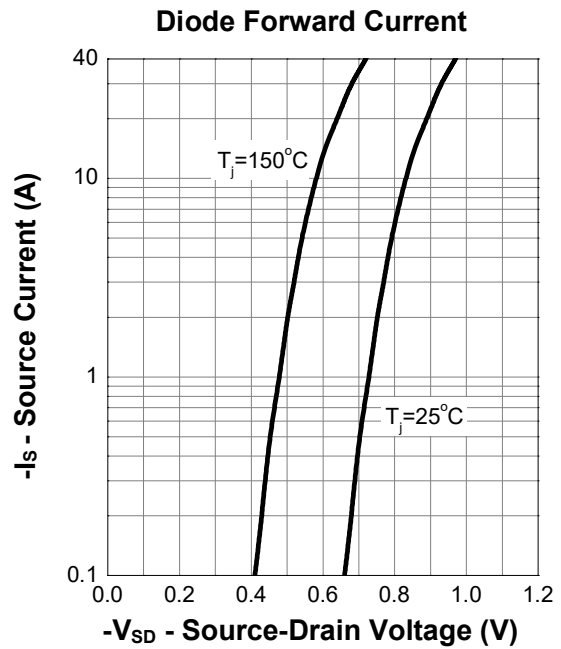
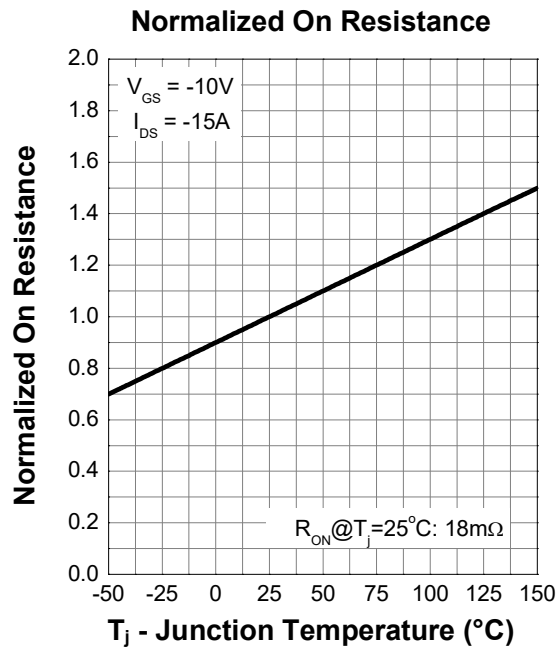
Transfer Characteristics



Normalized Threshold Voltage

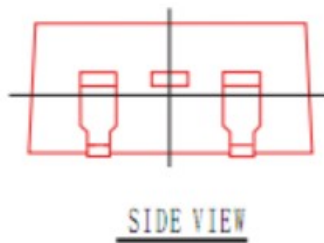
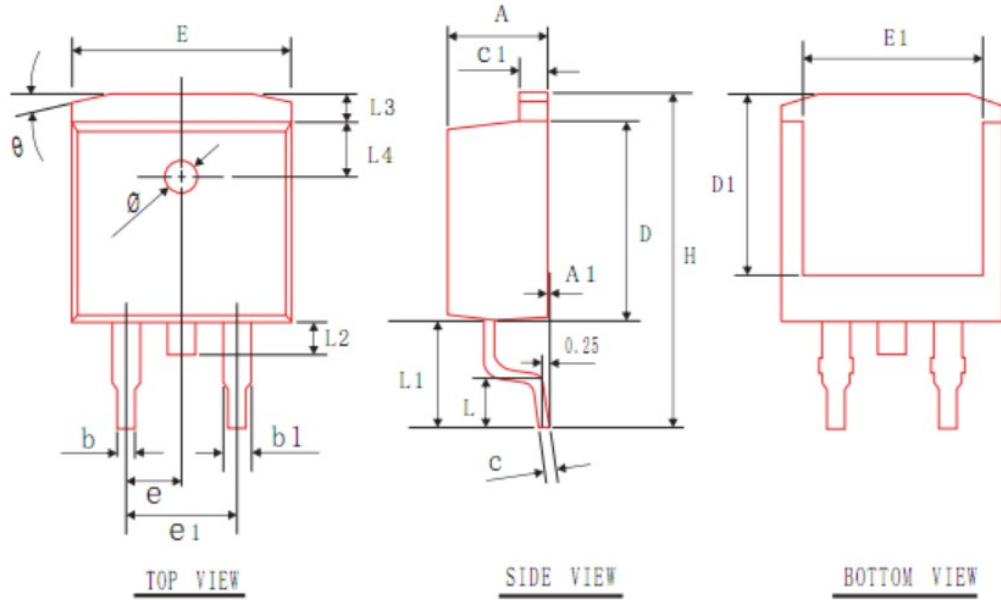


7. Typical Characteristics (Cont.)



8.Package Dimensions

TO263



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	4.30	4.70
A1	0.00	0.25
b	0.70	0.90
b1	1.20	1.40
c	0.40	0.55
c1	1.25	1.35
D	9.00	9.20
D1	8.00	8.20
H	14.90	15.20
E	9.80	10.20
E1	7.85	8.15
e1	4.93	5.23
L	2.00	2.45
L1	4.60	5.00
L2	1.30	1.70
L3	1.15	1.35
L4	2.40	2.60
Ø	1.50 REF	
e	2.54 BSC	
θ	13°TYP	