

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Surface-mounted package
- ☒ Super Trench
- ☒ Low Thermal Resistance
- ☒ Low ciss

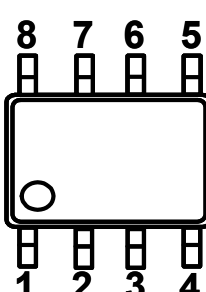
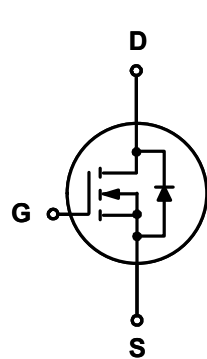
1.2 Applications

- ☒ Motor drivers
- ☒ DC - DC Converter

1.3 Quick reference

- ☒ $BV \leq 40\text{ V}$
- ☒ $P_{tot} \leq 2\text{ W}$
- ☒ $I_D \leq 12\text{ A}$
- ☒ $R_{DS(ON)} \leq 15\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ☒ $R_{DS(ON)} \leq 24\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1,2,3	Source	 Top View SOP- 8L	
4	Gate		
5,6,7,8	Drain		

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	40	-	V
V_{GS}	Gate-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	± 20	V
I_D^*	Drain Current	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	12	A
$I_{DM}^{*,***}$	Pulsed Source Current	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	6	A
P_{tot}^*	Total Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	2	W
T_{stg}	Storage Temperature		- 55	150	$^{\circ}\text{C}$
T_J	Junction Temperature		-	150	$^{\circ}\text{C}$
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	12	A
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	56	$^{\circ}\text{C} / \text{W}$

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
N1504S	1504 YWWXXX YWWXXX : Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
N1504S	SOP8			3000	

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

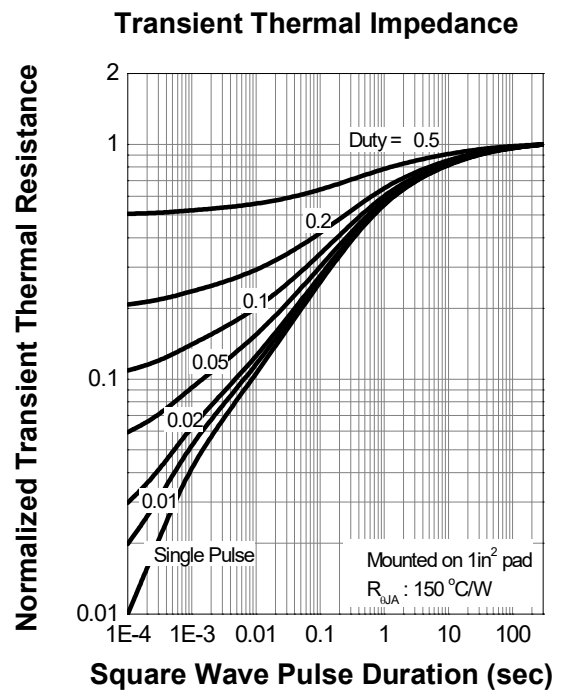
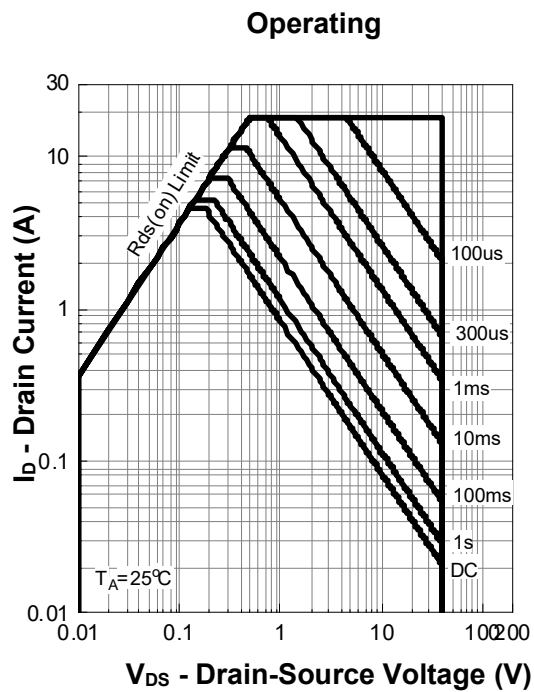
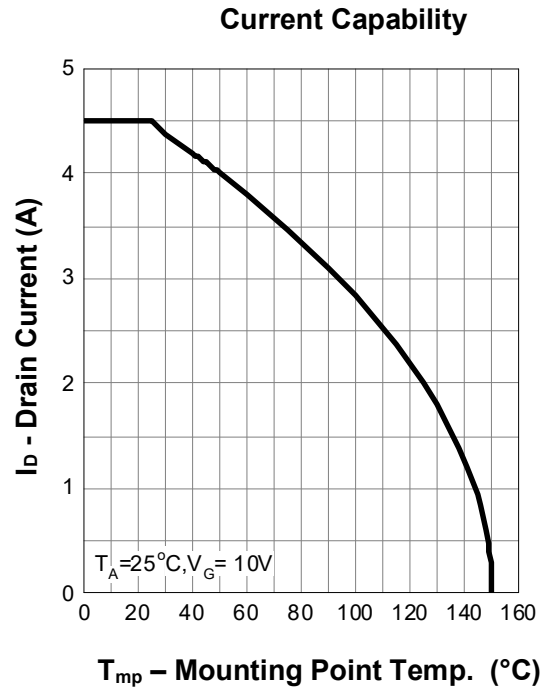
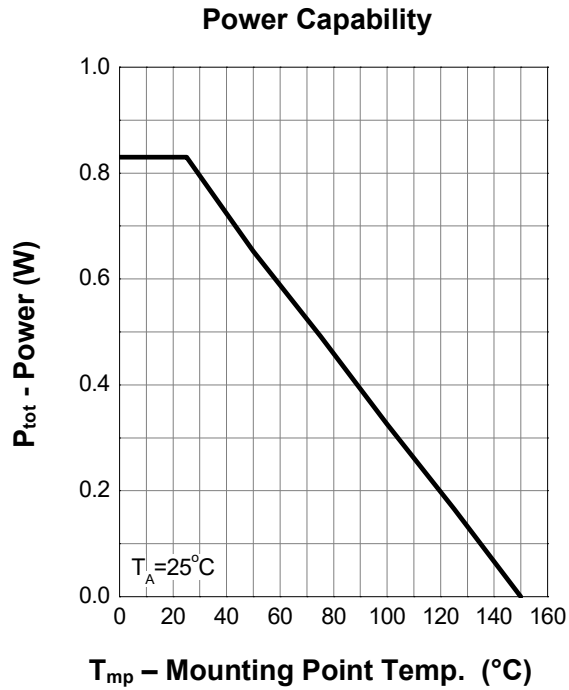
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	1	-	2	V
I _{DSS}	Zero Gate Voltage Source Current	V _{DS} = 36 V, V _{GS} = 0 V	-	-	1	μA
		T _J = 85 °C	-	-	30	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 = 4 A	-	14	15	m Ω
		V _{GS} = 4.5 V, I _D = 3 A	-	22	24	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 4 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} = 4 A, dI _{SD} /dt = 100 A/μs	-	13	-	nS
Q _{rr}	Reverse Recovery Charge		-	5.8	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 22.5 V Frequency = 1 MHz	-	308	-	pF
C _{oss}	Output Capacitance		-	124	-	
C _{rss}	Reverse Transfer Capacitance		-	34	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 22.5 V, V _{GEN} = 10 V, R _G = 4.5 Ω, R _L = 1.12 Ω, I _D = 4 A	-	5.1	-	nS
t _r	Turn-on Rise Time		-	41	-	
t _{d(off)}	Turn-off Delay Time		-	14	-	
t _f	Turn-off Fall Time		-	7.4	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 22.5 V, I _{DS} = 4 A	-	8	-	nC
Q _{gs}	Gate-Source Charge		-	2.1	-	
Q _{gd}	Gate-Drain Charge		-	1.9	-	

Notes :

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

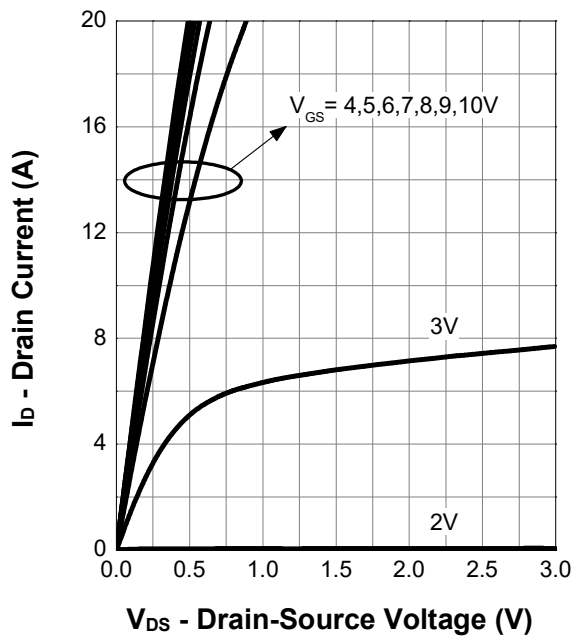
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

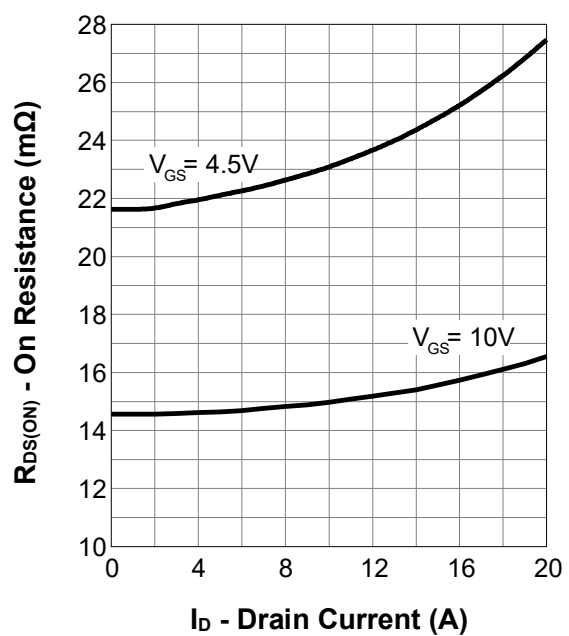


7. Typical Characteristics (cont.)

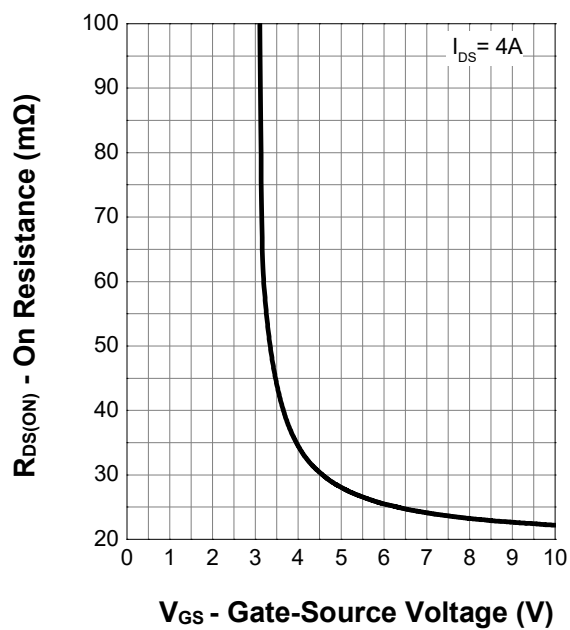
Output Characteristics



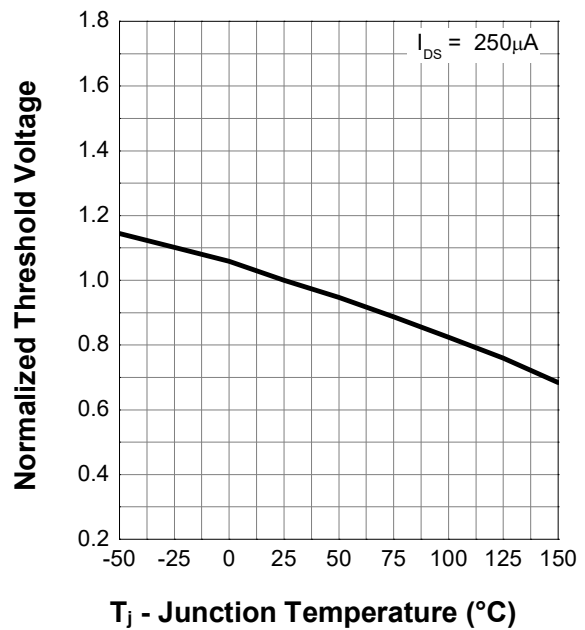
On Resistance



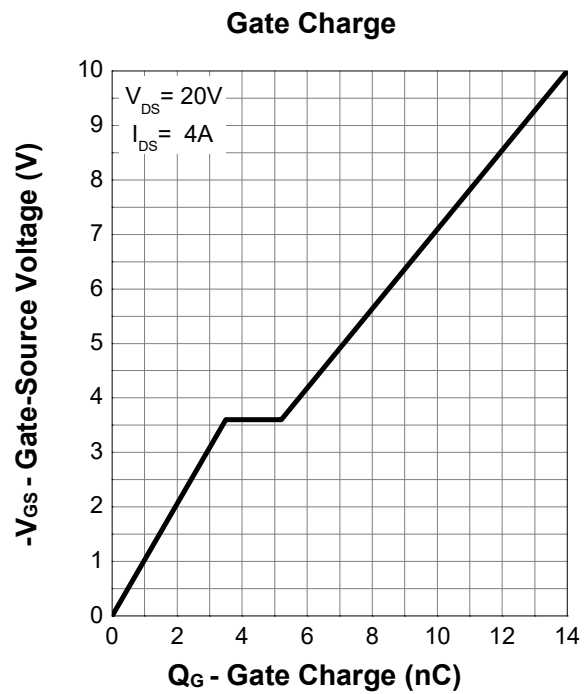
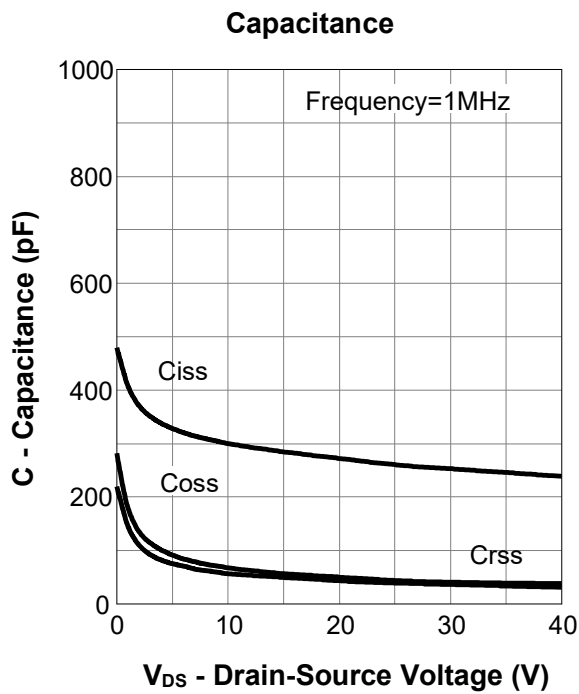
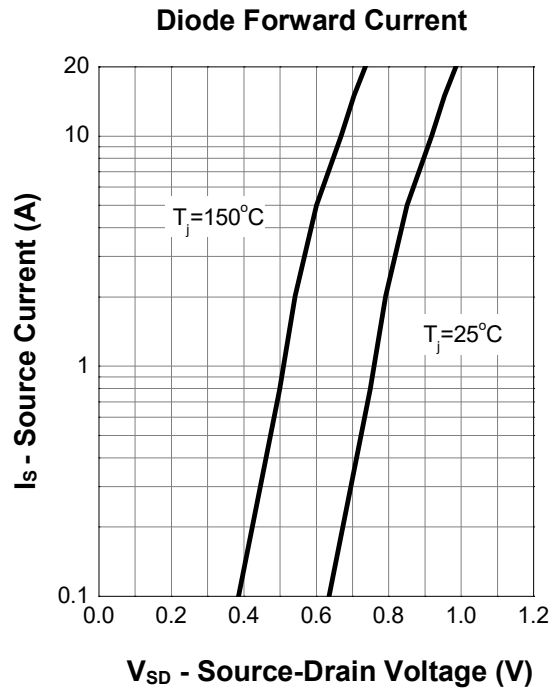
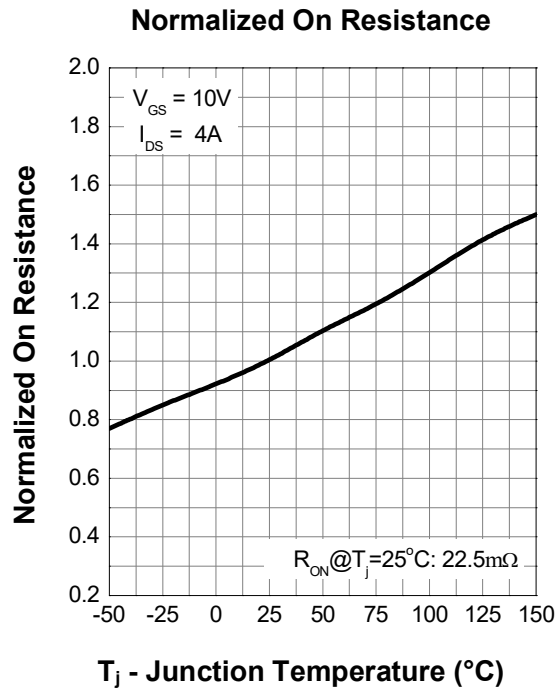
Transfer Characteristics



Normalized Threshold Voltage

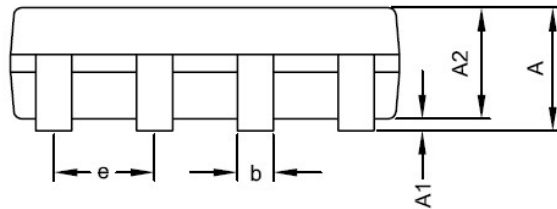
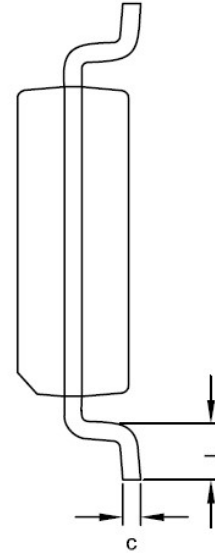
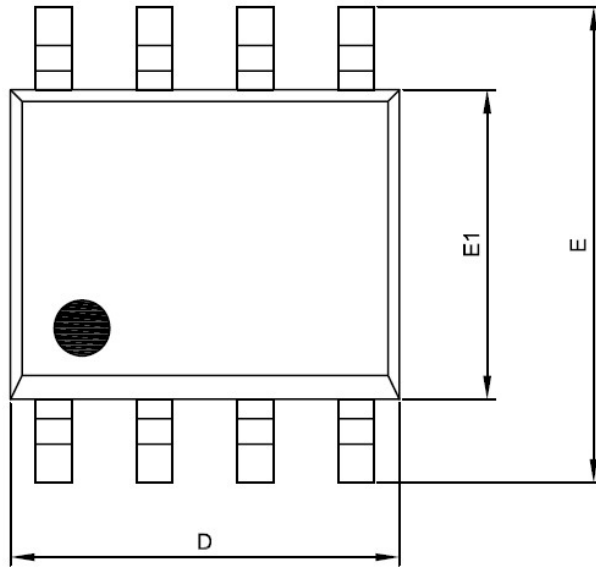


7. Typical Characteristics (cont.)



8. Package Dimensions

SOP- 8L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	1.35	1.75
A1	0.00	0.25
A2	1.15	1.50
D	4.80	5.00
E	5.80	6.20
E1	3.80	4.00
c	0.19	0.27
b	0.33	0.53
e	1.27 BSC	
L	0.40	1.27

Notes :

1. Jedec outline : MS-012AA
2. Dimensions " D " does not include mold flash, protrusions and gate burrs shall not exceed .15 mm (.006 in) per side .
3. Dimensions " E1 " does not include inter-lead flash, or protrusions. Inter-lead flash and protrusions shall not exceed .25 mm (.010 in) per side.