

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

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

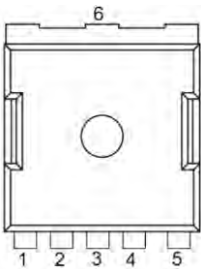
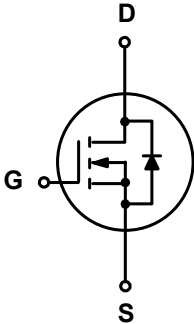
1.2 Applications

- ☒ LCD TV appliances
- ☒ High power inverter system
- ☒ LCDM appliances

1.3 Quick reference

- ☒ $BV \geq 40\text{ V}$
- ☒ $R_{DS(ON)} \leq 0.48\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ☒ $P_{tot} \leq 250\text{ W}$
- ☒ $R_{DS(ON)} \leq 0.85\text{ m}\Omega @ V_{GS} = 6\text{ V}$
- ☒ $I_D \leq 480\text{ A}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1,2,3,4	Source(S)	 Top View STOLL	
5	Gate(G)		
6	Drain(D)		

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 (DC)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	480	A
		$T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	300	A
I_{DM}^{***}	Drain Current (Pulsed)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	1200	A
P_{tot}	Drain power dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	250	W
T_{stg}	Storage Temperature		- 55	175	$^{\circ}\text{C}$
T_J	Junction Temperature		-	175	$^{\circ}\text{C}$
I_S	Continuous-Source Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	480	A
E_{AS}^{*}	Single Pulsed Avalanche Energy	$V_{DD} = 50\text{ V}, L = 1.0\text{ mH}$	-	1800	mJ
$R_{\theta JA}^{*}$	Thermal Resistance- Junction to Ambient		-	42	$^{\circ}\text{C/W}$
$R_{\theta JC}^{*}$	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
US004N04ST	004N04 YWWXXX YWWXXX: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
US004N04ST	sTOLL			2000	

6. Electrical Characteristics ($T_A=25^\circ$ Unless Otherwise Noted)

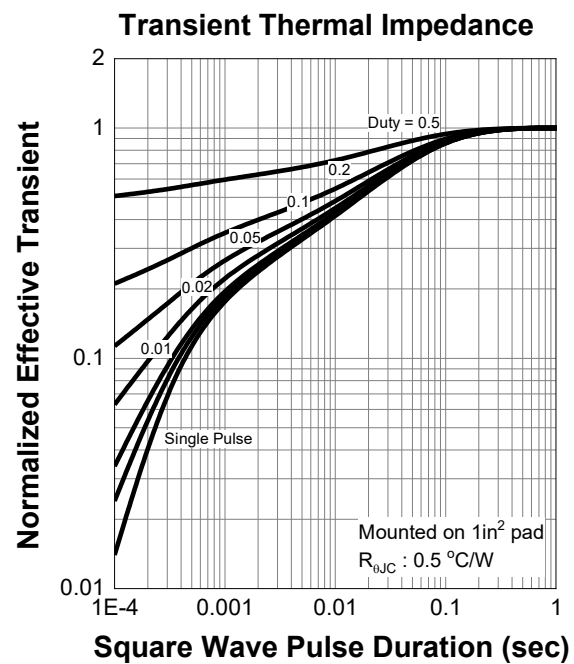
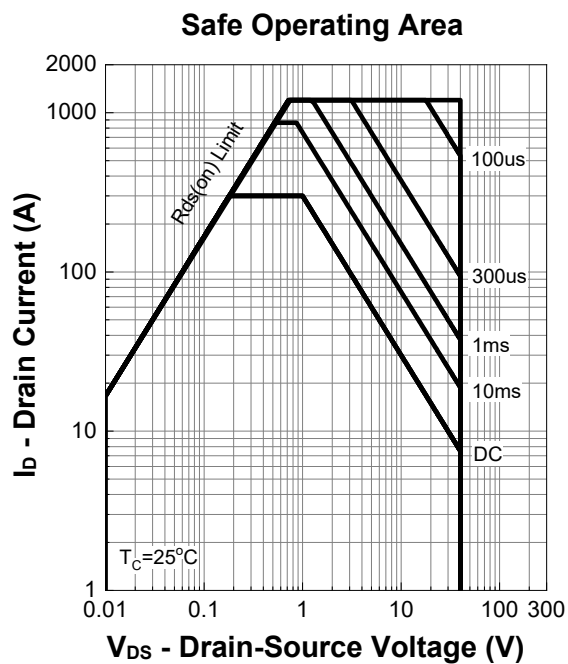
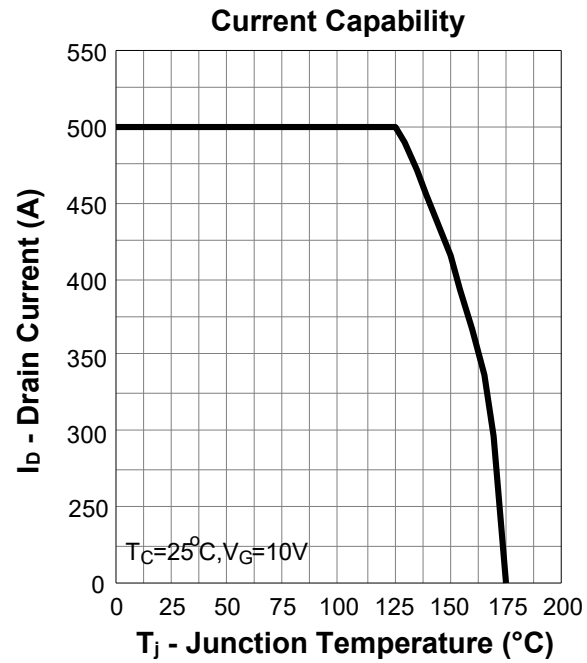
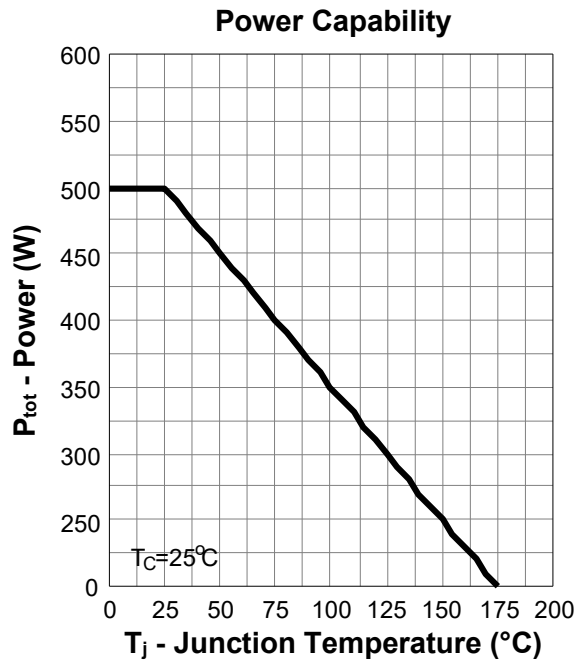
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	1.5	2.5	3.5	V
I _{DSS}	Drain Leakage Current	V _{DS} = 32 V, V _{GS} = 0 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} = 80 A	-	0.42	0.48	m Ω
		V _{GS} = 6 V, I _{DS} = 40 A	-	0.75	0.85	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 80 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{DS} = 80 A, V _{GS} = 0 V di _{SD} /dt = 100 A/μs	-	59	-	nS
Q _{rr}	Reverse Recovery Charge		-	60	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V Frequency = 1 MHz	-	10373	-	pF
C _{oss}	Output Capacitance		-	3651	-	
C _{rss}	Reverse Transfer Capacitance		-	72	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 20 V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 0.25 Ω, I _{DS} = 80 A	-	18	-	nS
t _r	Turn-on Rise Time		-	224	-	
t _{d(off)}	Turn-off Delay Time		-	139	-	
t _f	Turn-off Fall Time		-	142	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} = 20 V, V _{GS} = 10 V, I _{DS} = 80 A	-	178	-	nC
Q _{gs}	Gate-Source Charge		-	41	-	
Q _{gd}	Gate-Drain Charge		-	33	-	

Notes :

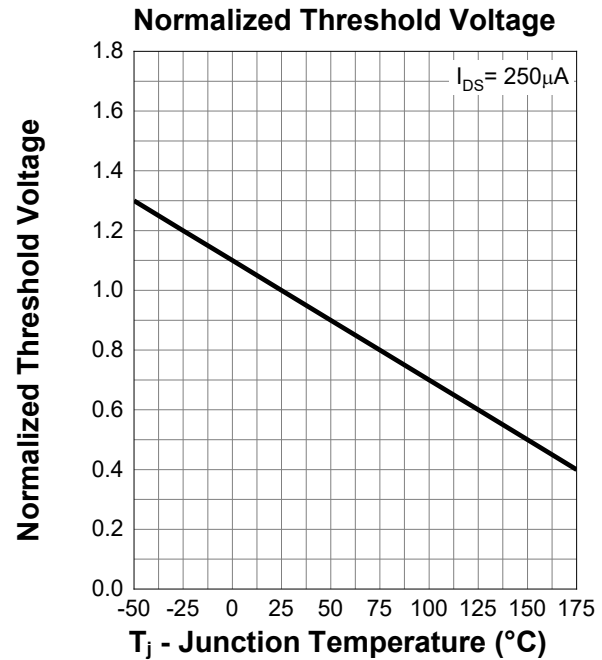
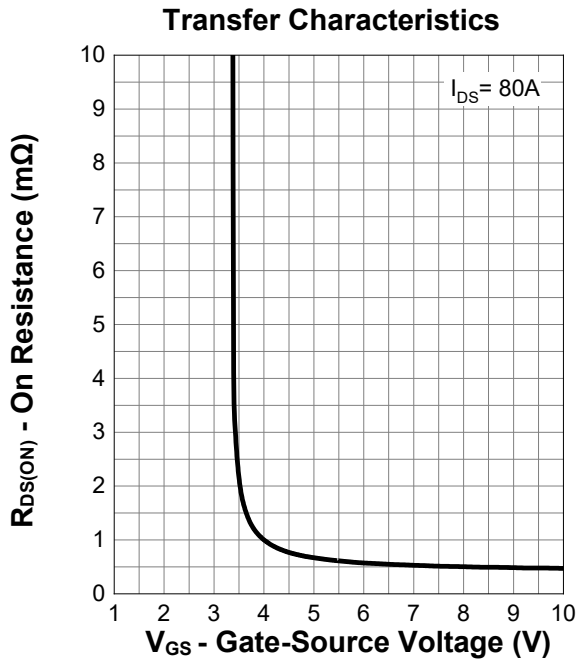
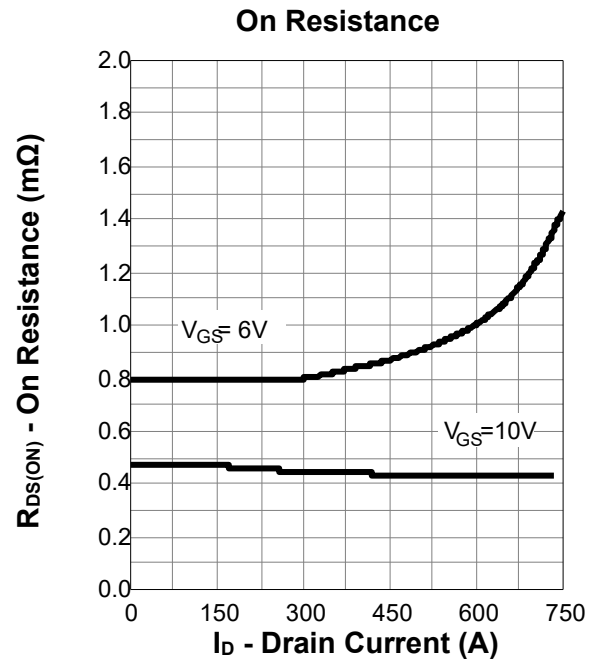
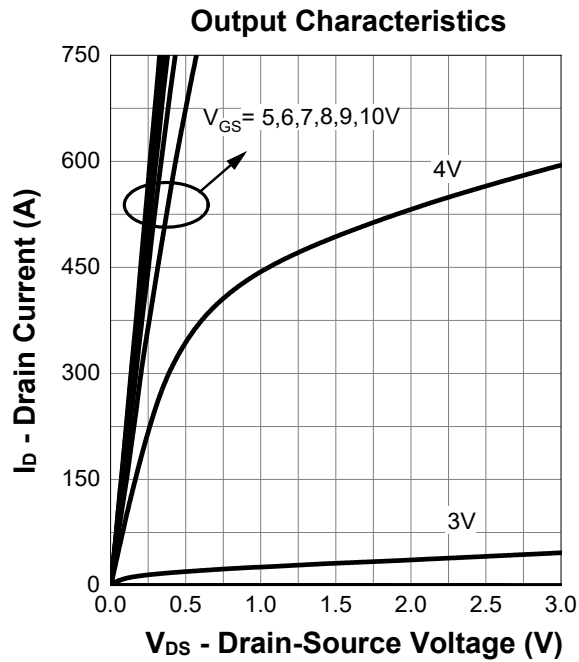
a : Pulse test ; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

b : Guaranteed by design, not subject to production testing

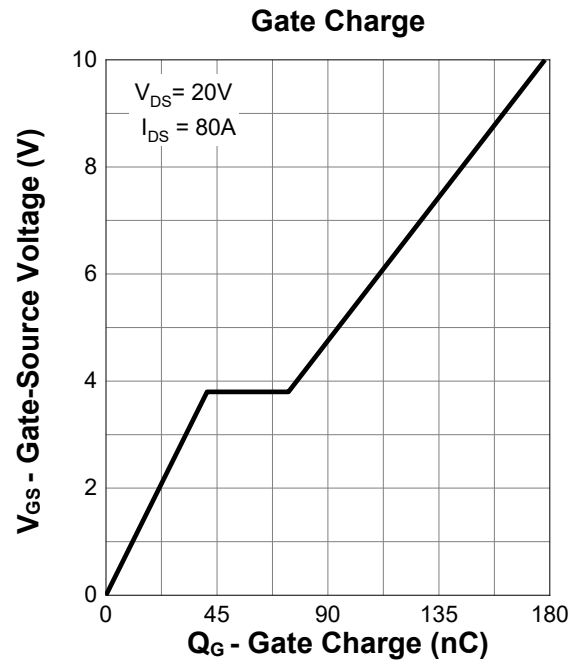
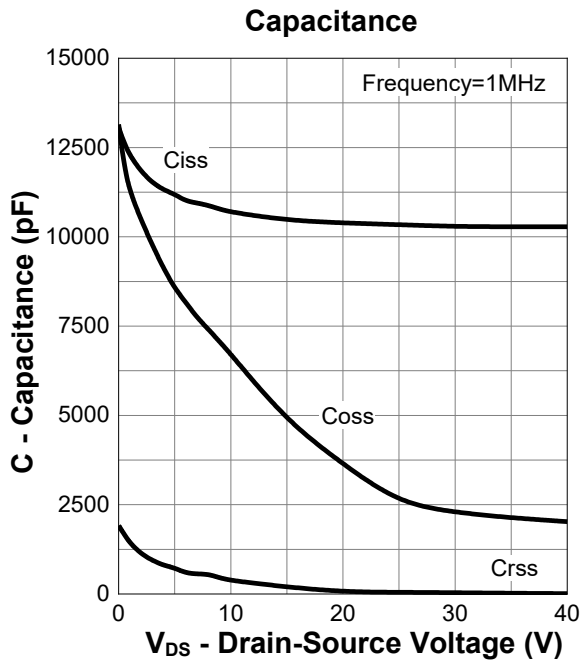
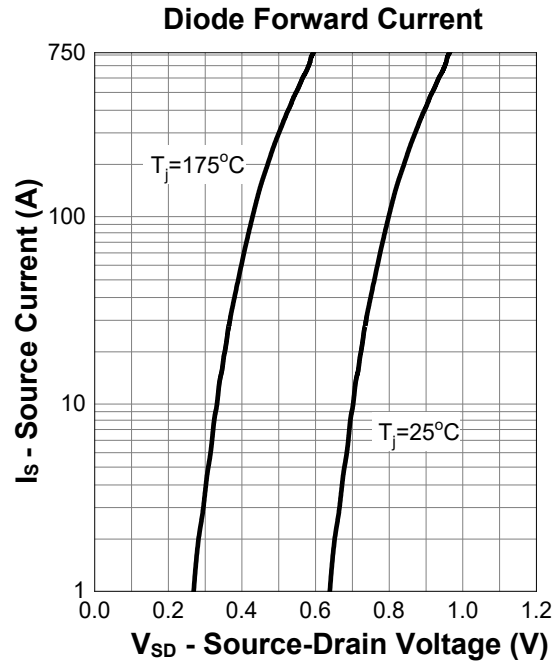
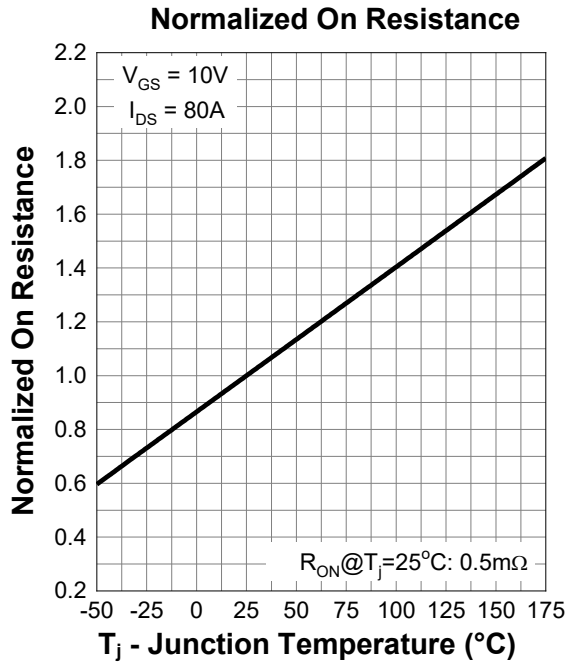
7. Typical Characteristics



7. Typical Characteristics (cont.)

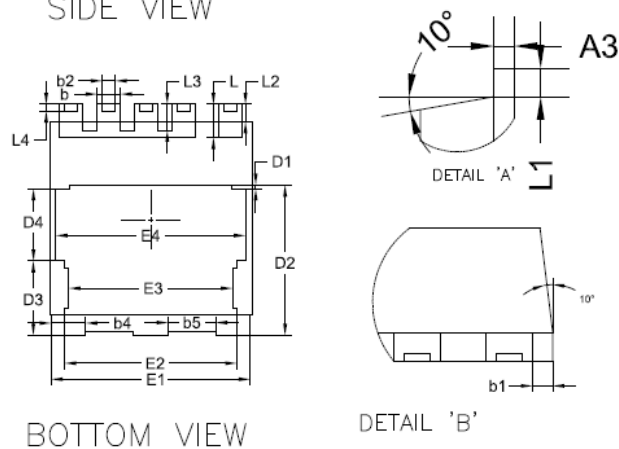
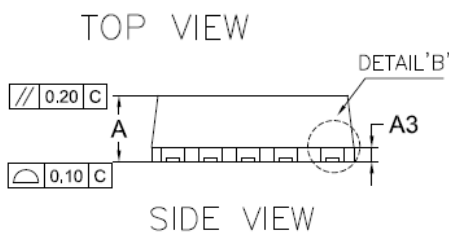
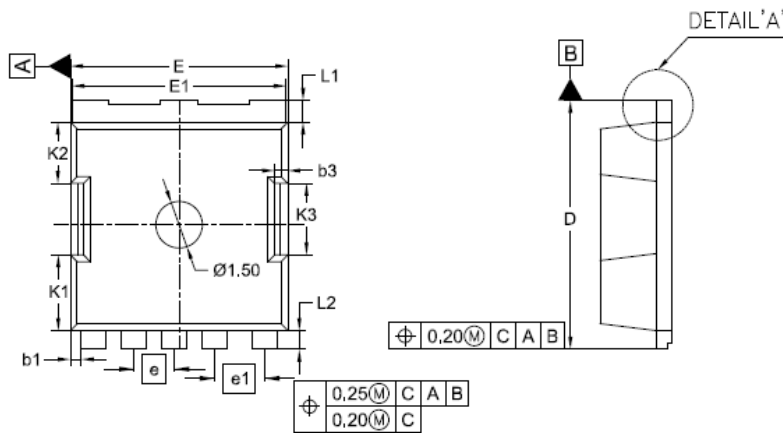


7. Typical Characteristics (cont.)



8. Package Dimensions

sTOLL Package



SYMBOLS	DIMENSION IN MM		
	MIN	NOM	MAX
A	2.300	2.200	2.400
A3	0.490	0.500	0.508
D	7.900	8.000	8.100
E	6.900	7.000	7.100
e	1.30 BSC		
e1	1.60 BSC		
D1	0.130 ref		
D2	5.100	5.200	5.300
D3	2.470	2.570	2.670
D4	2.400	2.500	2.600
b	0.750	0.800	0.850
b1	0.350 ref		
b2	0.350	0.450	0.550
b3	0.425 ref		
b4	1.100	1.200	1.300
b5	1.550	1.650	1.750
L	1.050	1.150	1.250
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.800	0.900	1.000
L4	0.135	0.235	0.335
E1	6.800	6.900	7.000
E2	5.860	5.960	6.060
E3	5.560	5.660	5.760
E4	6.460	6.560	6.660
K1	2.430 ref		
K2	1.970 ref		