

NP55N03SUG-E1-AY-VB Datasheet

N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^{a, e}	Q_g (Typ)
30	0.005 at $V_{GS} = 10$ V	80	31 nC
	0.006 at $V_{GS} = 4.5$ V	68	



N-Channel MOSFET

FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU



RoHS
COMPLIANT

APPLICATIONS

- OR-ing
- Server
- DC/DC

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	A
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Pulsed Drain Current	I_{DM}	250	mJ
Avalanche Current Pulse	I_{AS}	39	
Single Pulse Avalanche Energy	E_{AS}	94.8	
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	A
		$T_A = 25$ °C	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	W
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	32	40	°C/W
Maximum Junction-to-Case	R_{thJC}	0.5	0.6	

Notes:

a. Based on $T_C = 25$ °C.

b. Surface mounted on 1" x 1" FR4 board.

c. $t = 10$ sec.

d. Maximum under steady state conditions is 90 °C/W.

e. Calculated based on maximum junction temperature. Package limitation current is 90 A.

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		35		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 7.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		2.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	90			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 38.8\text{ A}$		0.005		Ω
		$V_{GS} = 4.5\text{ V}, I_D = 37\text{ A}$		0.006		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 38.8\text{ A}$		160		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2201		pF
Output Capacitance	C_{oss}			525		
Reverse Transfer Capacitance	C_{rss}			270		
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 38.8\text{ A}$		61	107	nC
		$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 28.8\text{ A}$		31.5	50	
Gate-Source Charge	Q_{gs}			10		
Gate-Drain Charge	Q_{gd}			6		
Gate Resistance	R_g	$f = 1\text{ MHz}$		1.4	2.1	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.625\text{ }\Omega$ $I_D \cong 24\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		18	27	ns
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			70	105	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.67\text{ }\Omega$ $I_D \cong 22.5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		55	83	
Rise Time	t_r			180	270	
Turn-Off Delay Time	$t_{d(off)}$			55	83	
Fall Time	t_f			12	18	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			120	A
Pulse Diode Forward Current ^a	I_{SM}				120	
Body Diode Voltage	V_{SD}					

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Output Characteristics



Transfer Characteristics



Transconductance



$R_{DS(on)}$ vs. Drain Current



Capacitance



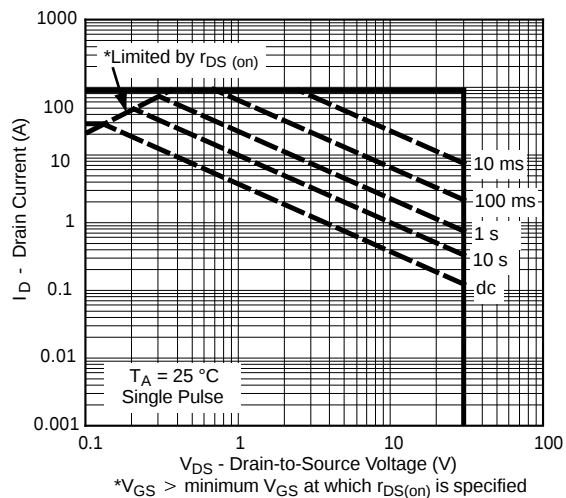
Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

On-Resistance vs. Junction Temperature

Forward Diode Voltage vs. Temperature

 $R_{DS(on)}$ vs. V_{GS} vs. Temperature

Threshold Voltage

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



*The power dissipation P_D is based on $T_{J(max)} = 175$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12				
DWG: 5347				

Note

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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