

55A, 30V N-CHANNEL ENHANCEMENT MODE POWER MOSFET**DESCRIPTION:**

The ALP055N03D is an 55A, 30V N-Channel Enhancement Mode Power MOSFET and it has advanced power trench technology that has been especially tailored to minimize the on-state resistance and maintain superior switching performance.

FEATURES:

- $V_{DS} = 30V$, $I_D = 55A$.
- $R_{DS(ON)} = 8.5m\Omega$ @ $V_{GS} = 10V$, $I_D = 55A$.
- $R_{DS(ON)} = 12.5m\Omega$ @ $V_{GS} = 4.5V$, $I_D = 55A$.
- Advanced High Cell Density Trench Technology
- Excellent package for heat dissipation.
- Fully characterized avalanche voltage and current.
- Good stability and uniformity with high E_{AS}
- Lead-free parts meet RoHS requirements.
- Suffix “-H” indicated Halogen Free part, ex. ALP055N03D-H

APPLICATIONS:

- Power Management Switches.
- Synchronous Buck Converter.

MECHANICAL CHARACTERISTICS

- Case: Molded plastic, TO-252
- Mounting Position: Any.

MAXIMUM RATINGS

MAXIMUM RATINGS @ $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified				
PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current @10V (Note 1)	$T_C = 25^{\circ}\text{C}$	I_D	55	A
	$T_C = 100^{\circ}\text{C}$		40	
Pulsed Drain Current (Note 2)		I_{DM}	125	A
Total Power Dissipation $T_C = 25^{\circ}\text{C}$		P_D	34.7	W
Avalanche Current		I_{AS}	30	A
Single pulse avalanche energy (Note 3)		E_{AS}	45	mJ
Operating Junction Temperature		T_J	-55 to +150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-55 to +150	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS @ $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified			
PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction to Ambient (Note 1)	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Case (Note 1)	$R_{\theta JC}$	3.6	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS @ T_A = 25 °C unless otherwise specified

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μA	V _{(BR)DSS}	30			V
Zero gate voltage drain current T _J =25°C	V _{DS} =30V, V _{GS} =0V	I _{DSS}			1.0	μA
Gate-body leakage current	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}			±100	nA
ON CHARACTERISTICS						
Gate-Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(th)}	1.2	1.6	2.5	V
Drain-to-Source On-Resistance (Note 2)	V _{GS} = 10V, I _D = 30A	R _{DS(ON)}		7.2	8.5	mΩ
	V _{GS} = 4.5V, I _D = 15A			9.3	12.5	
Forward transconductance	V _{DS} = 5V, I _D = 30A	g _{FS}		37		S

DYNAMIC CHARACTERISTICS						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Input Capacitance	V _{DS} = 15V, V _{GS} = 0V, F _{req} = 1.0 MHz	C _{iss}		1107		pF
Output Capacitance	V _{DS} = 15V, V _{GS} = 0V, F _{req} = 1.0 MHz	C _{oss}		163		pF
Reverse Transfer Capacitance	V _{DS} = 15V, V _{GS} = 0V, F _{req} = 1.0 MHz	C _{rss}		115		pF

SWITCHING CHARACTERISTICS						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Gate Resistance	V _{DS} = 0V, V _{GS} = 0V, F _{req} = 1.0 MHz	R _g		2.2		Ω
Total Gate Charge	V _{DS} = 15V, V _{GS} = 4.5V, I _D = 15A	Q _g		15		nC
Gate to Source Charge	V _{DS} = 15V, V _{GS} = 4.5V, I _D = 15A	Q _{gs}		3.6		nC
Gate to Drain Charge	V _{DS} = 15V, V _{GS} = 4.5V, I _D = 15A	Q _{gd}		6.8		nC
Turn-On Delay Time	V _{DD} = 15V, V _{GS} = 10V, I _D = 15A, R _G =3.3Ω	t _{d(on)}		8		nS
Turn-On Rise time	V _{DD} = 15V, V _{GS} = 10V, I _D = 15A, R _G =3.3Ω	t _r		9.9		nS
Turn-Off Delay Time	V _{DD} = 15V, V _{GS} = 10V, I _D = 15A, R _G =3.3Ω	t _{d(off)}		32		nS
Turn-Off Fall time	V _{DD} = 15V, V _{GS} = 10V, I _D = 15A, R _G =3.3Ω	t _f		15		nS

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Continuous Source Current (Note 1, 5)	V _G = V _D = 0V, Force Current	I _S			55	A
Diode forward Voltage (Note 2)	I _S = 1A, V _{GS} = 0V	V _{DS}			1.0	V
Body Diode Reverse recovery time	I _F = 30A, dI/dt =100A/μs	t _{rr}		15		nS
Body Diode Reverse recovery charge	I _F = 30A, dI/dt =100A/μs	Q _{rr}		4.4		nC

Note:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=30A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

TYPICAL DEVICE RATING AND CHARACTERISTICS CURVES ($T_A = 25^\circ\text{C}$ unless otherwise noted)

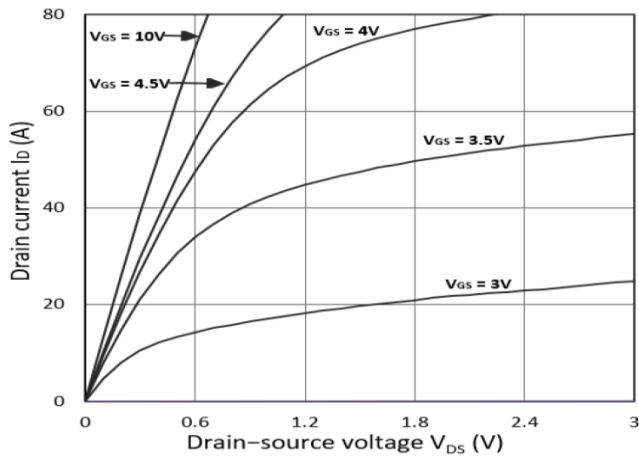


Fig.1 OUTPUT CHARACTERISTICS

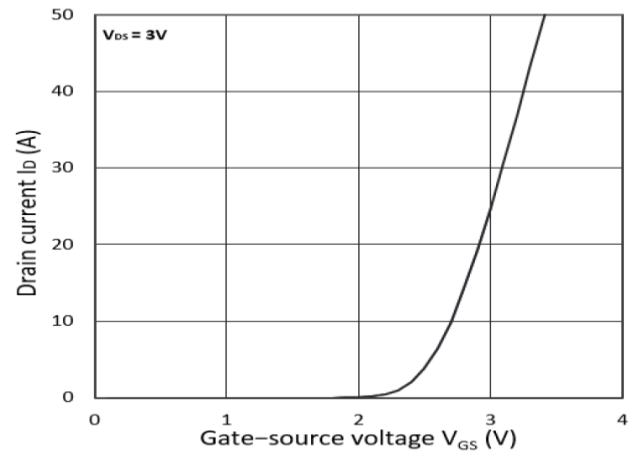


Fig.2 TRANSFER CHARACTERISTICS

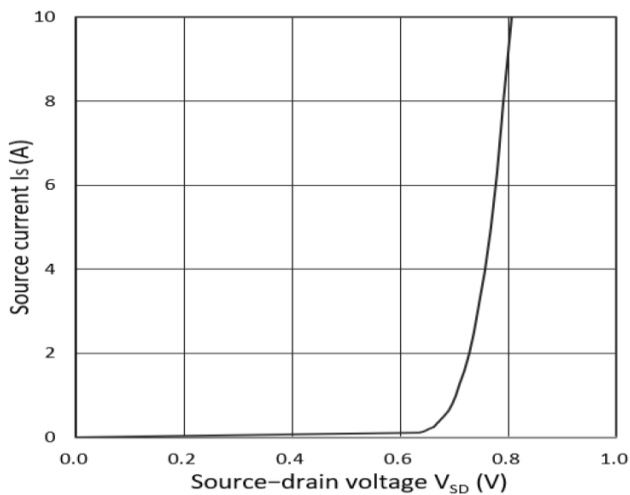


Fig.3 FORWARD CHARACTERISTICS OF REVERSE

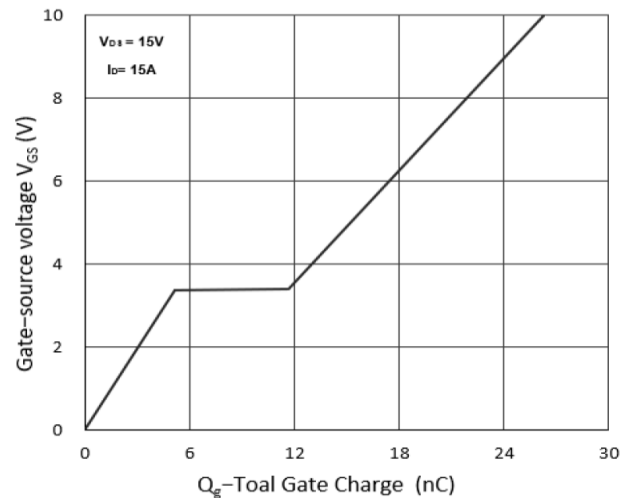


Fig.4 GATE CHARGE CHARACTERISTICS

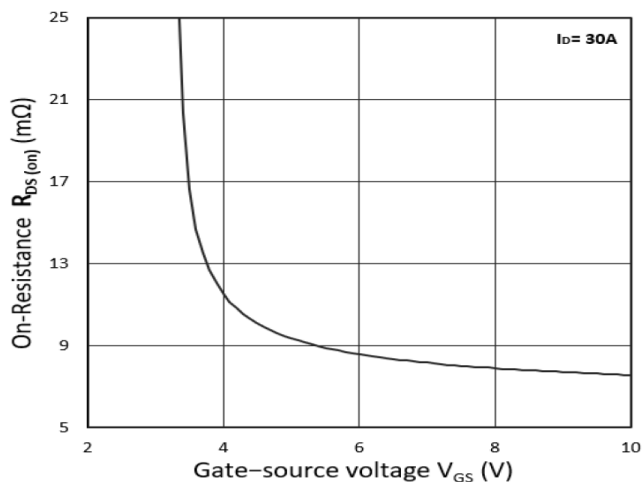


Fig.5 $R_{DS(on)}$ vs. V_{GS}

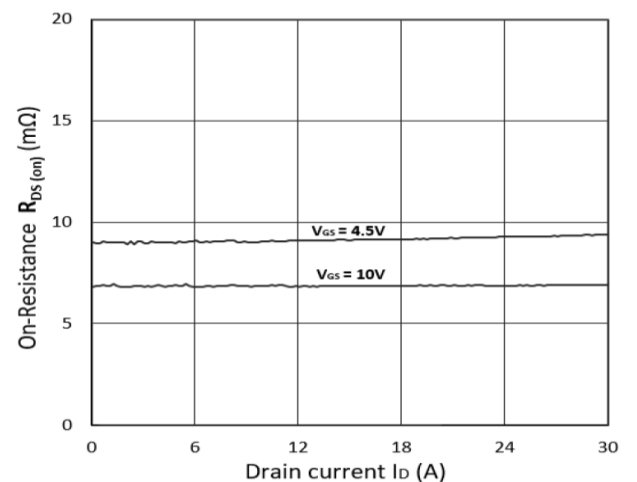


Fig.6 $R_{DS(on)}$ vs. I_D

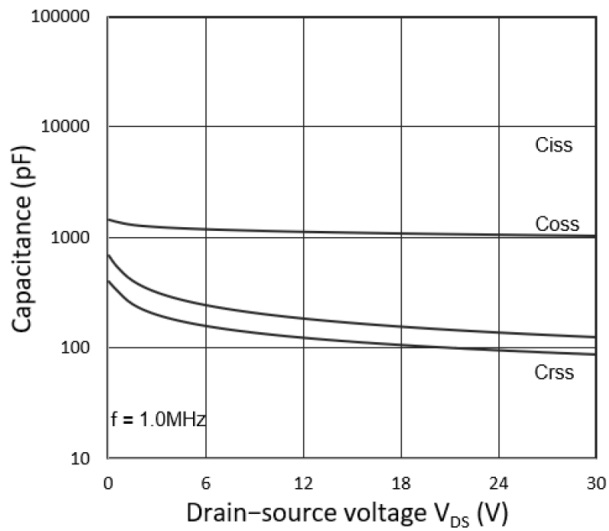


Fig.7 CAPACITANCE CHARACTERISTICS

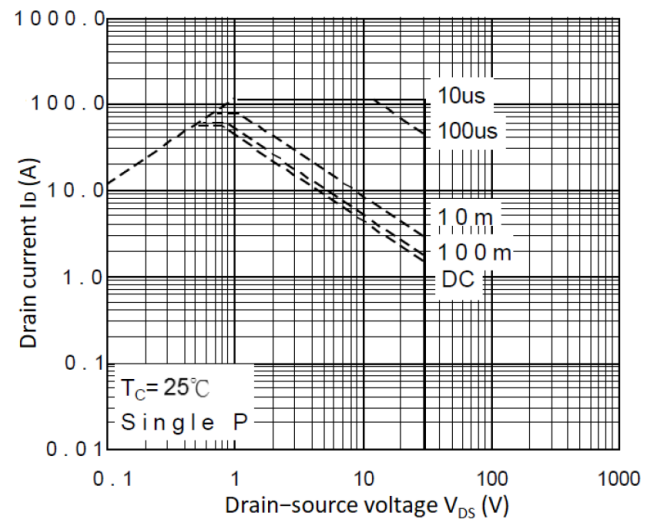


Fig.8 SAFE OPERATION AREA

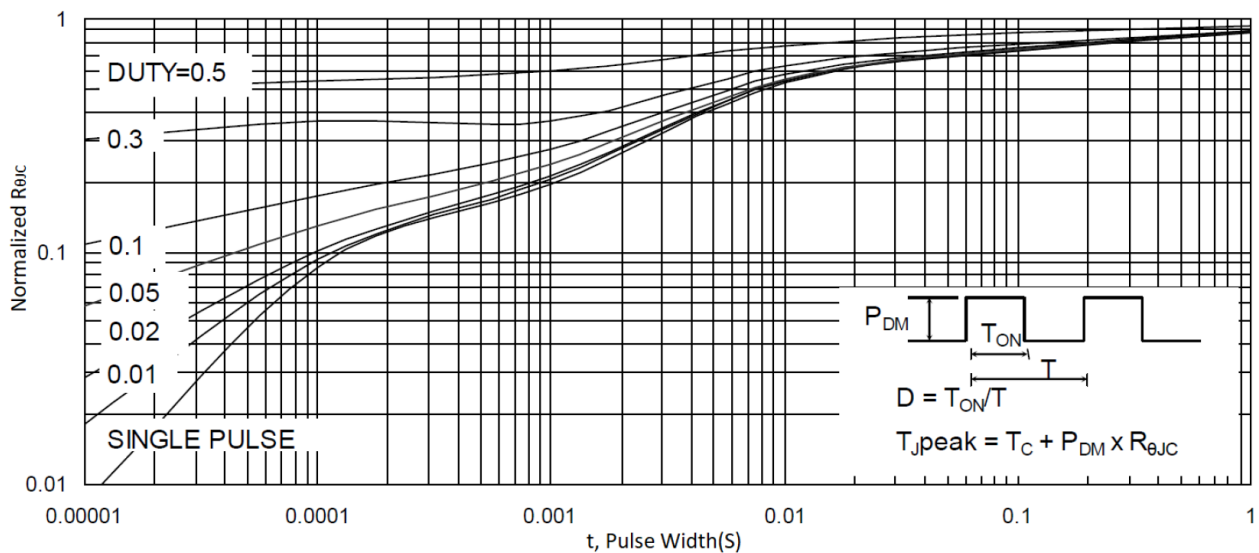


Fig.9 NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

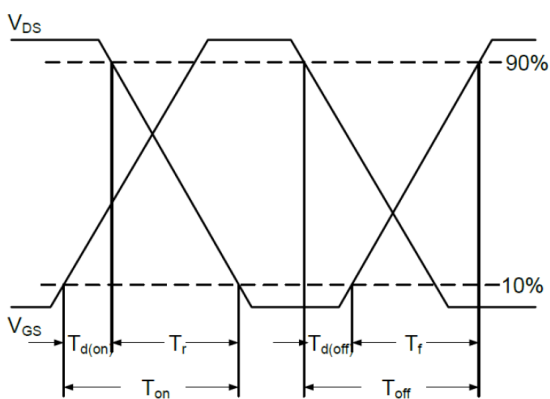


Fig.10 SWITCHING TIME WAVEFORM

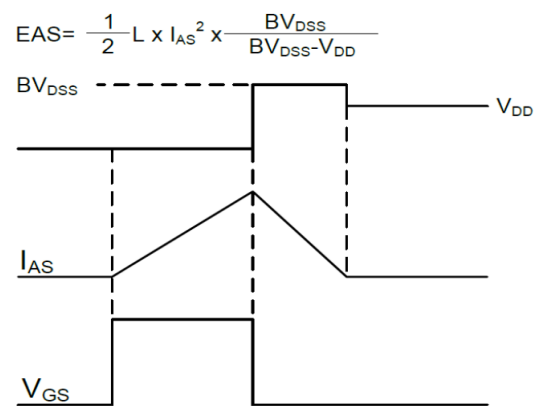
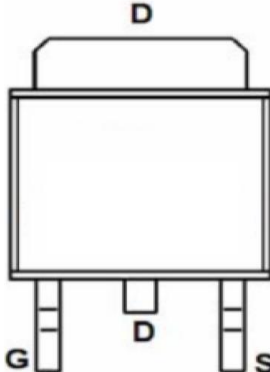
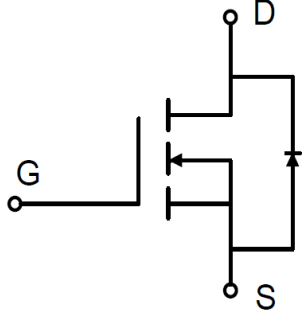


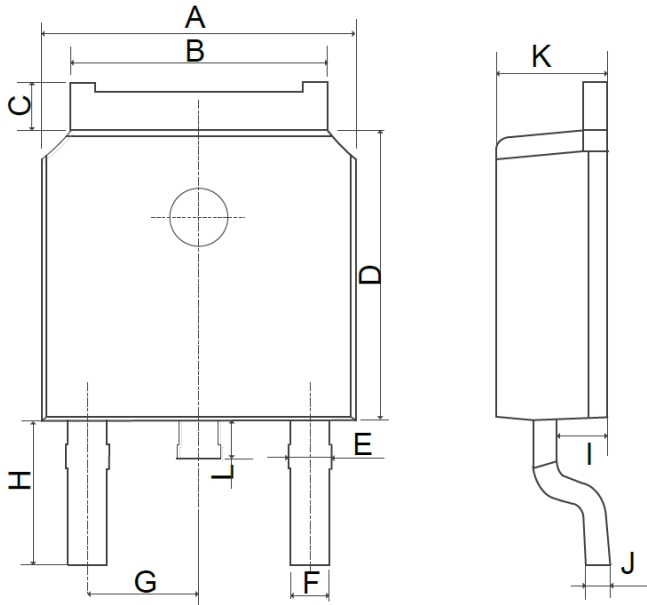
Fig.11 UNCLAMPED INDUCTIVE SWITCHING WAVEFORM

PINNING INFORMATION

PIN	SIMPLIFIED OUTLINE	CIRCUIT DIAGRAM
D Drain S Source G Gate		

PACKAGE INFORMATION

TO-252

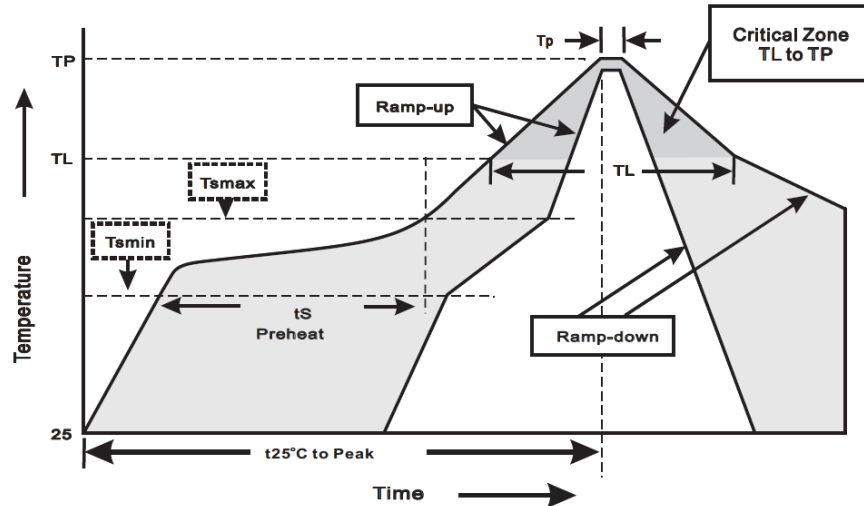


OUTLINE DIMENSIONS		
SYMBOL	MILLIMETERS	
	MIN	MAX
A	6.40	6.80
B	5.13	5.50
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	2.90REF	
I	0.85	1.17
J	0.51REF	
K	2.10	2.50
L	0.40	1.00

SOLDERING PARAMETERS

SUGGESTED THERMAL PROFILES FOR SOLDERING PROCESSES

1. Storage environment: Temperature=5 °C~40 °C Humidity=55% ±25%
2. Reflow soldering of surface-mount devices



3. Reflow soldering

PROFILE FEATURE	SOLDERING CONDITION
Average ramp-up rate (T_L to T_P)	<3 °C/sec
Preheat	
- Temperature Min (T_{smin})	150 °C
- Temperature Max (T_{smax})	200 °C
- Time (min to max) (t_s)	60 ~ 120 sec
T_{smax} to T_L	
- Ramp-upRate	<3 °C/sec
Time maintained above:	
- Temperature (T_L)	217 °C
- Time(t_L)	60 ~ 260 sec
Peak Temperature (T_P)	255 °C-0/+5 °C
Time within 5 °C of actual Peak Temperature(t_P)	10 ~ 30 sec
Ramp-down Rate	<6 °C/sec
Time 25 °C to Peak Temperature	<6 minutes



beyond boundaries...

ALP055N03D

TO-252

CUSTOMER NOTE:

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2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).



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