

142A, 100V N-CHANNEL ENHANCEMENT MODE MOSFET

DESCRIPTION:



The ALP142N10 is an 142A, 100V N-Channel enhanced mode power MOSFET and it has fast switched speed

FEATURES:

- $V_{DS}=100V$, $I_D = 142A$
- $R_{DS(ON)} \leq 4.4m\Omega$ @ $V_{GS}=10V$, $I_D=20A$.
- Fast switching speed.
- Reliable and rugged.
- Lead-free parts meet RoHS requirements
- Suffix “-H” indicated Halogen Free part, ex. ALP142N10-H

APPLICATIONS:

- Power management in DC to DC Converter.
- USB Power delivery (USB PD).

MECHANICAL CHARACTERISTICS

- Epoxy: UL94-V0 rated flame retardant.
- Case: Molded plastic, T5060P8
- Mounting Position: Any.
- Approximate Weight: 0.084 grams.

MAXIMUM RATINGS

MAXIMUM RATINGS @ $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified			
PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current $T_C = 25^{\circ}\text{C}$ $T_C = 100^{\circ}\text{C}$	I_D	142 107	A
Pulsed Drain Current (Note 1)	I_{DM}	160	A
Avalanche current, Single pulse ($L=0.5\text{mH}$) (Note 2)	I_{AS}	30	A
Single pulse avalanche energy ($L=0.5\text{mH}$) (Note 2)	E_{AS}	225	mJ
Power Dissipation $T_C = 25^{\circ}\text{C}$ $T_C = 100^{\circ}\text{C}$	P_D	125 50	W
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	48	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Case	$R_{\theta JC}$	1.0	$^{\circ}\text{C/W}$
Operating Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 to +150	$^{\circ}\text{C}$
Note: 1. Max. current is limited by bonding wire. 2. UIS tested and pulse width are limited by maximum junction temperature 150°C .			

ELECTRICAL CHARACTERISTICS @ TA = 25 °C unless otherwise specified

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	100			V
Drain-source leakage current	$V_{DS}=80V, V_{GS}=0V$	I_{DSS}			1.0	μA
Gate-source leakage current	$V_{GS}= \pm 20V, V_{DS}= 0V$	I_{GSS}			± 100	nA
On Characteristics						
Gate-Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(th)}$	2.0	3.0	4.0	V
Static Drain-to-Source On-Resistance (Note 4)	$V_{GS} = 10V, I_D = 20A$	$R_{DS(ON)}$		3.6	4.4	m Ω
Forward Trans Conductance	$V_{GS} = 5V, I_D = 10A$	g_{fs}		22		S

DYNAMIC CHARACTERISTICS (Note 5)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Input Capacitance	$V_{DS} = 50V, V_{GS} = 0V, F_{req} = 1.0\text{ MHz}$	C_{iss}		4175		pF
Output Capacitance	$V_{DS} = 50V, V_{GS} = 0V, F_{req} = 1.0\text{ MHz}$	C_{oss}		1190		pF
Reserve Transfer Capacitance	$V_{DS} = 50V, V_{GS} = 0V, F_{req} = 1.0\text{ MHz}$	C_{rss}		35		pF
Gate Resistance	$V_{DS} = 0V, V_{GS} = 0V, F_{req} = 1.0\text{ MHz}$	R_G		0.6		Ω

SWITCHING CHARACTERISTICS

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Total Gate Charge	$V_{DS} = 50V, V_{GS} = 10V, I_D = 20A$	Q_g		72.8		nC
Gate to Source Charge	$V_{DS} = 50V, V_{GS} = 10V, I_D = 20A$	Q_{gs}		21.5		nC
Gate to Drain Charge	$V_{DS} = 50V, V_{GS} = 10V, I_D = 20A$	Q_{gd}		20.7		nC
Turn-On Delay Time	$V_{DS} = 25V, I_D = 1A, V_{GS} = 10V, R_G = 3\Omega$	$t_{d(on)}$		12.8		nS
Rise time	$V_{DS} = 25V, I_D = 1A, V_{GS} = 10V, R_G = 3\Omega$	t_r		6.3		nS
Turn-Off Delay Time	$V_{DS} = 25V, I_D = 1A, V_{GS} = 10V, R_G = 3\Omega$	$t_{d(off)}$		40		nS
Fall time	$V_{DS} = 25V, I_D = 1A, V_{GS} = 10V, R_G = 3\Omega$	t_f		65		nS

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Drain-source diode forward voltage (Note 4)	$I_S = 10A, V_{GS} = 0V$	V_{SD}		0.75	1.1	V
Body diode reverse recovery time	$V_{DS}=50V, I_S=10A, dI/dt=100A/\mu s$	t_{rr}		40.4		ns
Body diode reverse recovery charge	$V_{DS}=50V, I_S=10A, dI/dt=100A/\mu s$	Q_{rr}		80.2		nC

Note:

- Surface mounted on 1in FR-4 board with 1oz. 2
- Pulse test (pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$).
- Guaranteed by design, not subject to production testing.

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

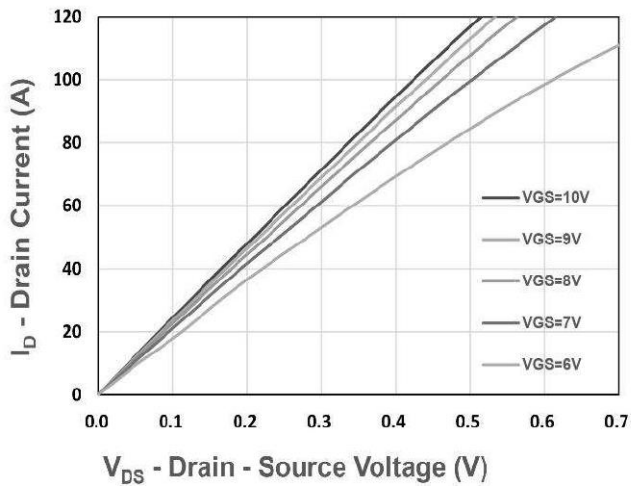


Fig.1 OUTPUT CHARACTERISTICS

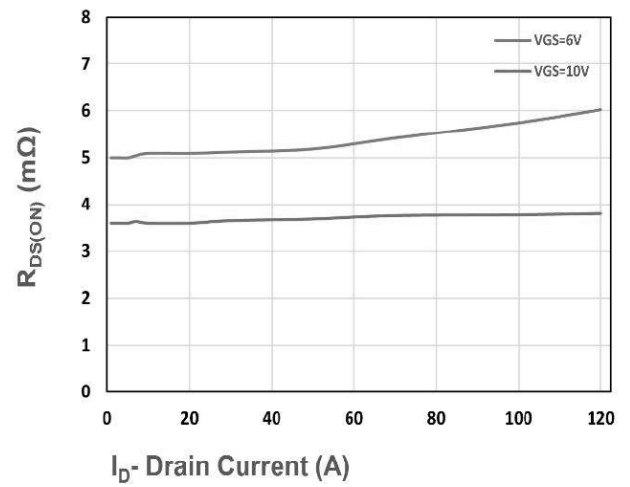


Fig.2 ON-RESISTANCE Vs. ID

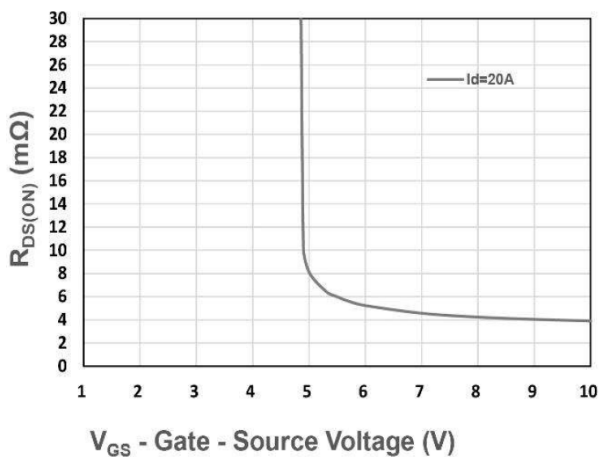


Fig.3 ON-RESISTANCE Vs. VGS

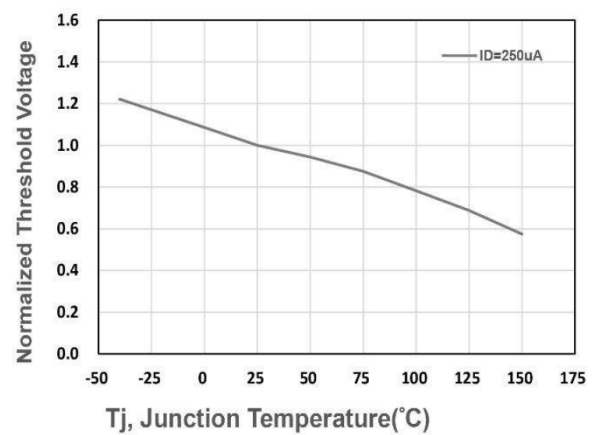


Fig.4 GATE THRESHOLD VOLTAGE

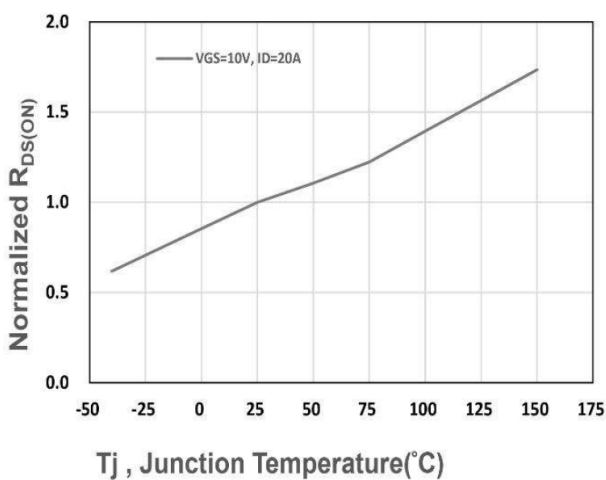


Fig.5 DRAIN-SOURCE ON RESISTANCE

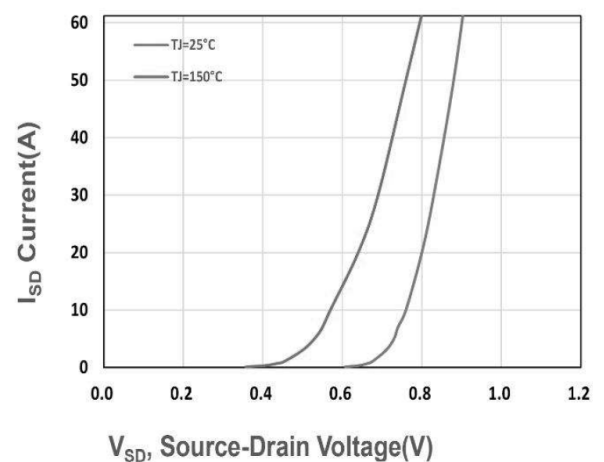
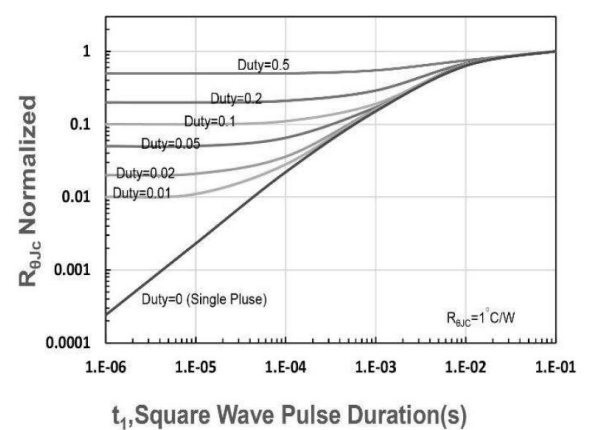
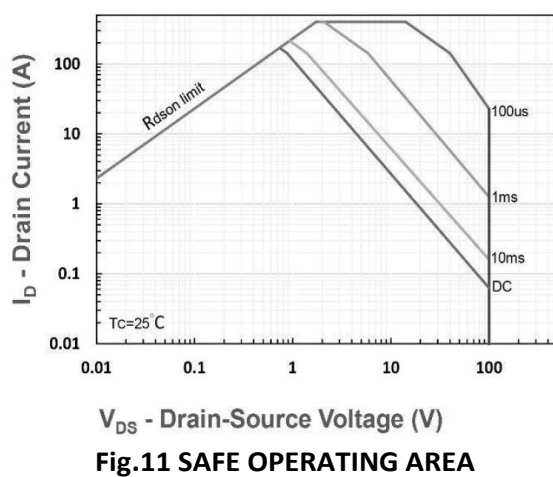
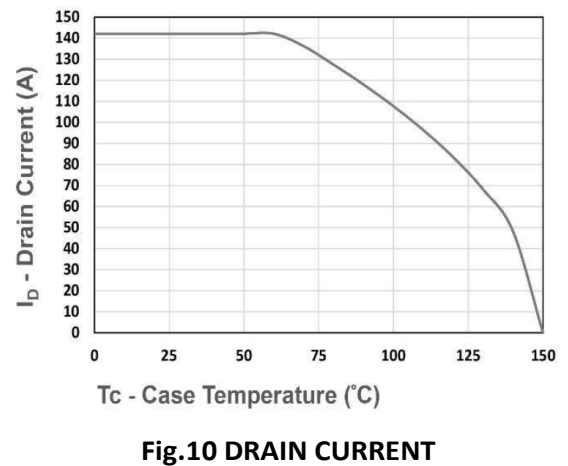
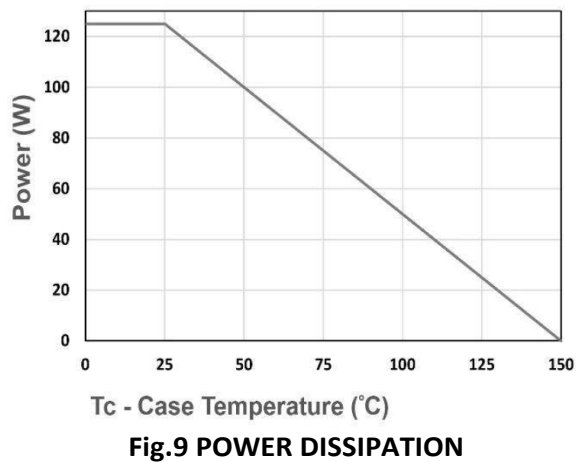
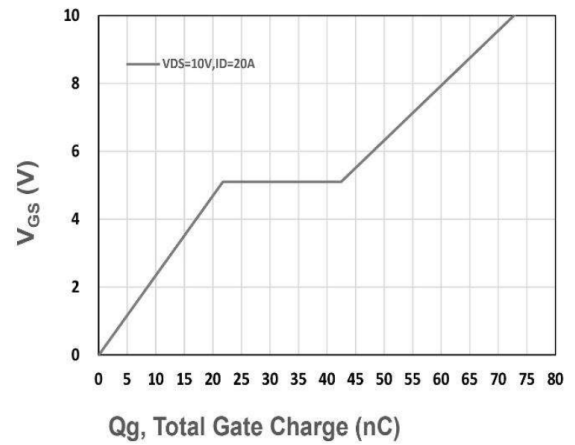
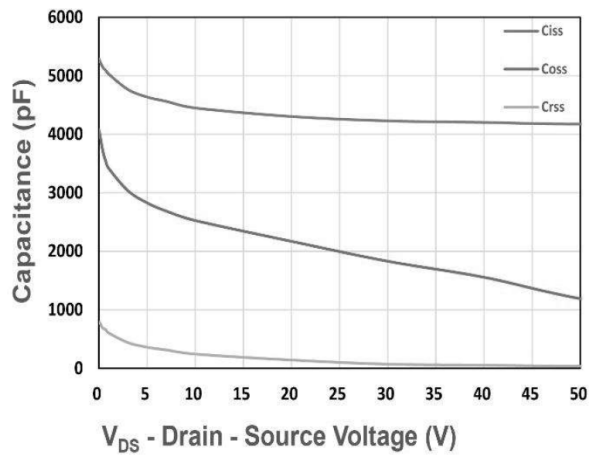
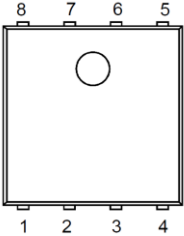
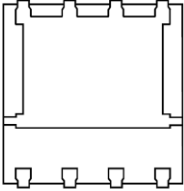
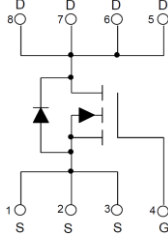


Fig.6 SOURCE-DRAIN DIODE FORWARD

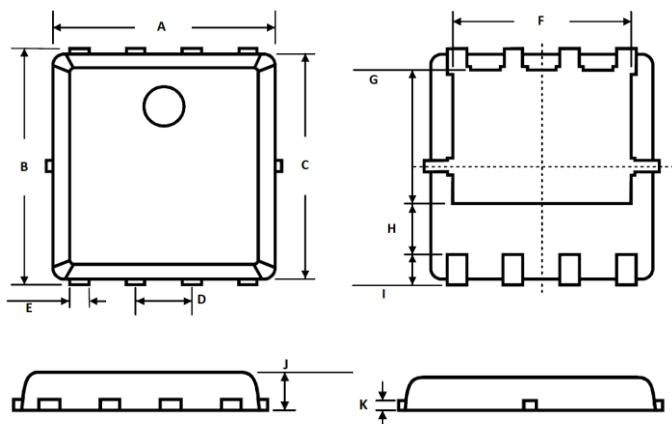


PINNING INFORMATION

PIN	SIMPLIFIED OUTLINE	SYMBOL
Pin1 Source Pin2 Source Pin3 Source Pin4 Gate Pin5 Drain Pin6 Drain Pin7 Drain Pin8 Drain	 	

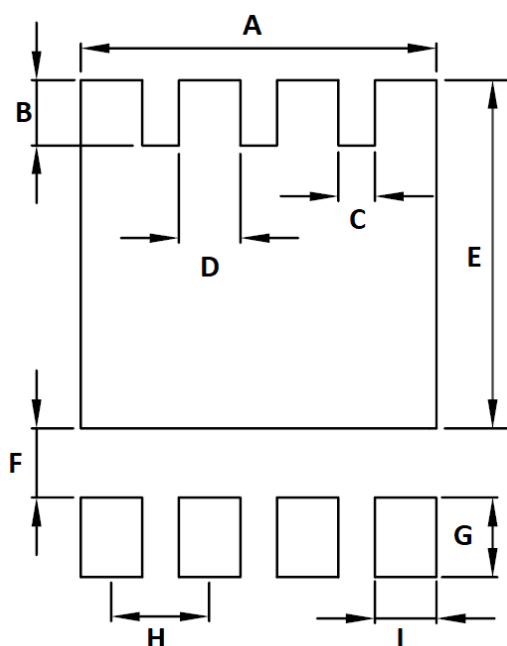
PACKAGE INFORMATION

T5060P8



OUTLINE DIMENSIONS				
SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.10	0.189	0.200
B	5.95	6.20	0.234	0.244
C	5.67	5.90	0.223	0.232
D	0.35	0.51	0.014	0.020
E	1.27 BSC		0.05 BSC	
F	3.61	4.11	0.142	0.162
G	3.38	3.78	0.133	0.149
H	1.40 REF		0.055 REF	
I	0.51	0.71	0.020	0.028
J	0.80	1.10	0.031	0.043
K	0.25 REF		0.010 REF	

SUGGESTED SOLDER PAD LAYOUT



OUTLINE DIMENSIONS	
SYMBOL	MILLIMETERS
A	4.60
B	0.85
C	0.80
D	0.47
E	4.50
F	0.90
G	1.00
H	1.27
I	0.80

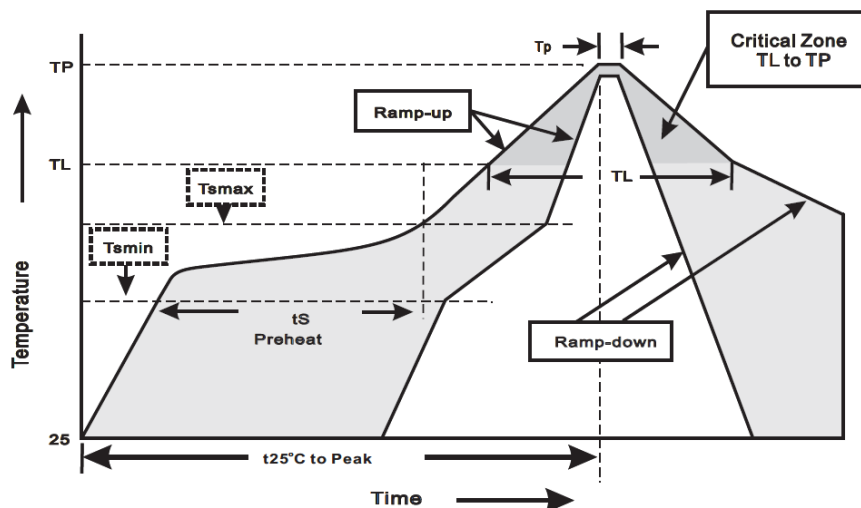
Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only.

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...

ALP142N10
T5060P8

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).



sales@alpinesemi.com
www.alpinesemi.com