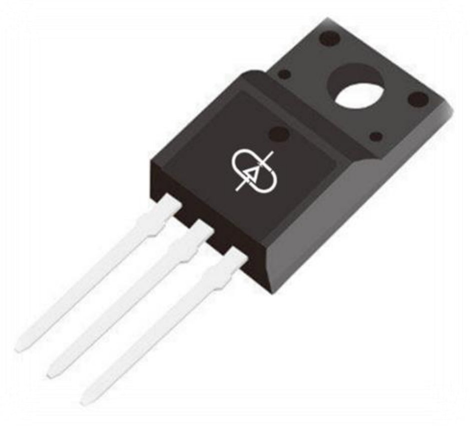
150V N-CHANNEL POWER MOSFET

DESCRIPTION:



The ALPP155N15S is an 67A, 150V N-Channel Power MOSFET and it has High Speed Power Smooth Switching.

FEATURES:

- $R_{DS\,(ON)\,typ}$ = 13.5mΩ, $I_{D\,(Silicon\,Limited)}$ = 67A, V_{DS} = 150V
- High Speed Power Smooth Switching
- Enhanced Body diode dv/dt capability
- Enhanced Avalanche Ruggedness
- 100% UIS Tested, 100% Rg Tested
- RoHS compliant & halogen-free.
- Suffix “-H” indicated Halogen Free part, ex. ALPP155N15S-H

APPLICATIONS:

- Synchronous Rectification in SMPS.
- Hard Switching and High-Speed Circuit.
- Power Tools
- UPS
- Motor Control.

MECHANICAL CHARACTERISTICS

- Epoxy: UL94-V0 rated flame retardant.
- Case: Molded plastic, TO-220
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position: Any.

ORDERING PART NUMBER

PART NUMBER	ORDERING PART NUMBER
ALPP155N15S	**ALPP155N15S-SM**

MAXIMUM RATINGS

MAXIMUM RATINGS @ T_A = 25 °C unless otherwise specified

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Silicon Limited)	@T_C=25℃	I_D	67	A
	@T_C=100℃		47	
Pulsed Drain Current		I_{DM}	220	A
Single pulse avalanche energy	L=0.4mH, @T_C=25℃	E_{AS}	125	mJ
Power Dissipation	@T_C=25℃	P_D	174	W
Operating Junction Temperature Range		T_J	-55 to +175	°C
Storage Temperature Range		T_{STG}	-55 to +175	°C

Note:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive rating: pulse width limited by maximum junction temperature.
3. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

THERMAL CHARACHTERISTICS @ T_A = 25 °C unless otherwise specified

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	60	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	0.86	°C/W

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 μA	$V_{(BR)DSS}$	150			V
Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=150V, T_j=25°C	I_{DSS}			1.0	μA
	V_{GS}=0V, V_{DS}=150V, T_j=100°C				100	
Gate-source leakage current	V_{GS} = ±20V, V_{DS}= 0V	I_{GSS}			±100	nA
ON CHARACTERISTICS						
Gate-Threshold Voltage	V_{GS}= $V_{DS,}$ I_D = 250μA	$V_{GS(TH)}$	2.0	2.9	4.0	V
Drain-to-Source On-Resistance	V_{GS} = 10V, I_D = 20A	$R_{DS(ON)}$		13.5	16	mΩ
Transconductance	V_{DS}=5V, I_D=20A	g_{fs}		58		S
Gate Resistance	V_{GS}=0V, V_{DS} Open, f=1MHz	R_G		1.0		Ω

SWITCHING PARAMETERS						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Input Capacitance	V_{GS} = 0V, V_{DS} = 75V, f=1MHz	C_{iss}		2500		pF
Output Capacitance		C_{oss}		183		
Reserve Transfer Capacitance		C_{rss}		10		
Total Gate Charge	V_{DD}=75V, I_D=20A, V_{GS}=10V	Q_g		29		nC
Gate to Source Charge		Q_{gs}		9		
Gate to Drain (Miller) Charge		Q_{gd}		4		
Turn-On Delay Time	V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=10Ω	$t_{d(on)}$		12		nS
Rise time		t_r		8		
Turn-Off Delay Time		$t_{d(off)}$		20		
Fall time		t_f		9		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
Drain forward voltage	V_{GS} = 0V, I_F = 20A	V_{SD}		0.9		V
Reverse recovery time	V_R=75V, I_F=20A, dI_F/dt=100A/μs	t_{rr}		68		ns
Reverse recovery charge		Q_{rr}		116		nC

TYPICAL DEVICE RATING AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

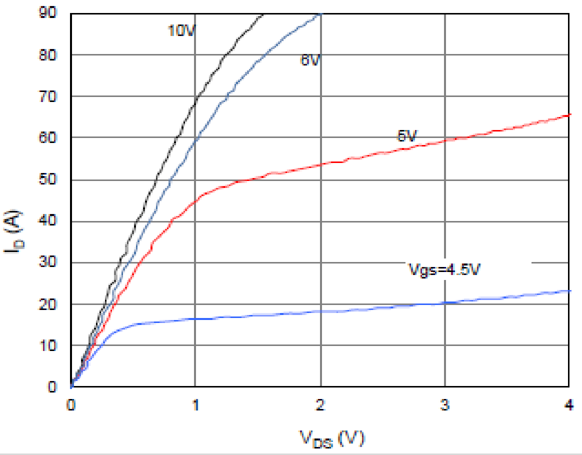


Fig.1 TYPICAL OUTPUT CHARACTERISTICS

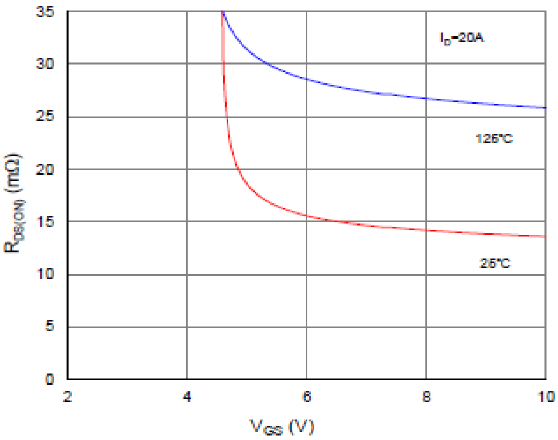


Fig.2 ON-RESISTANCE VS. GATE-SOURCE VOLTAGE

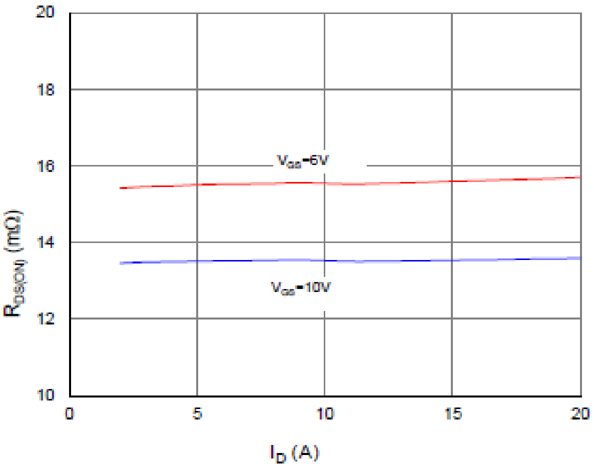


Fig.3 ON-RESISTANCE VS. DRAIN CURRENT AND GATE VOLTAGE

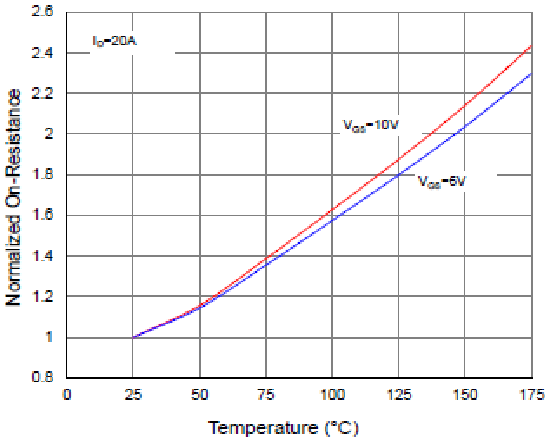


Fig.4 NORMALIZED ON-RESISTANCE VS. JUNCTION TEMPERATURE

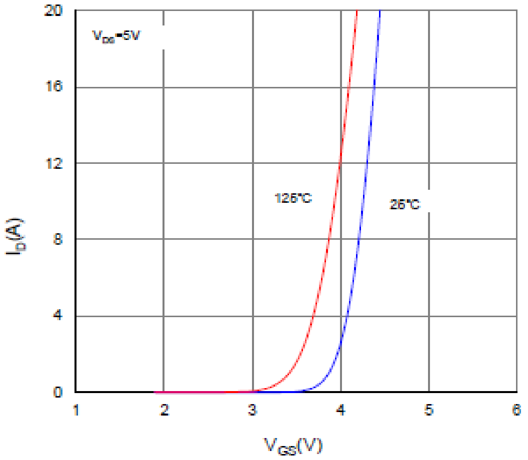


Fig.5 TYPICAL TRANSFER CHARACTERISTICS

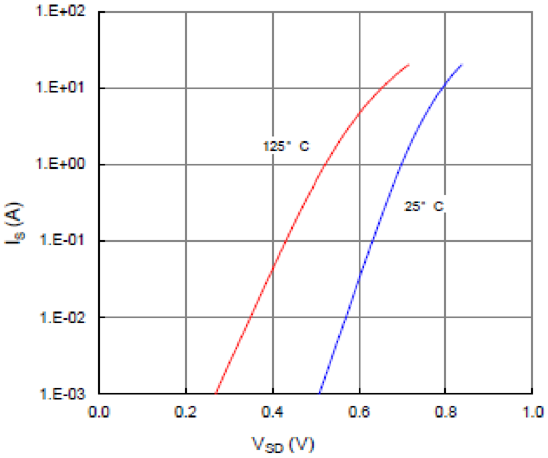


Fig.6 TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

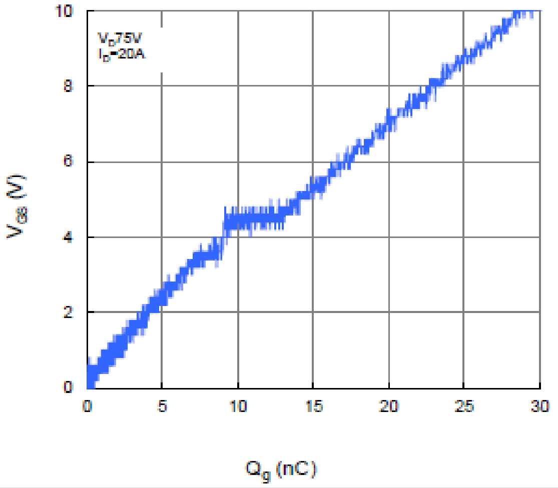


Fig.7 TYPICAL GATE-CHARGE VS. GATE-TO-SOURCE VOLTAGE

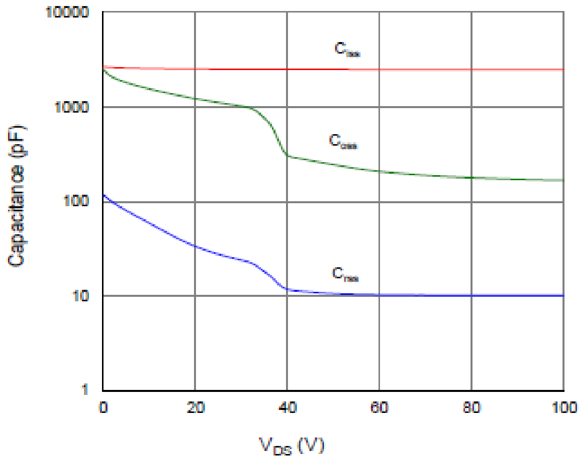


Fig.8 TYPICAL CAPACITANCE VS. DRAIN-TO-SOURCE VOLTAGE

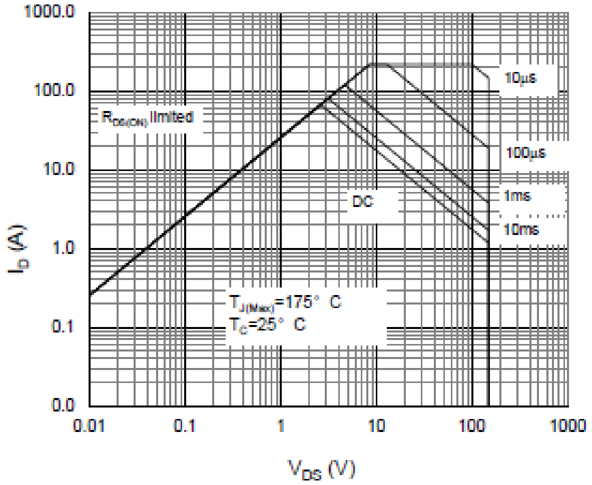


Fig.9 MAXIMUM SAFE OPERATING AREA

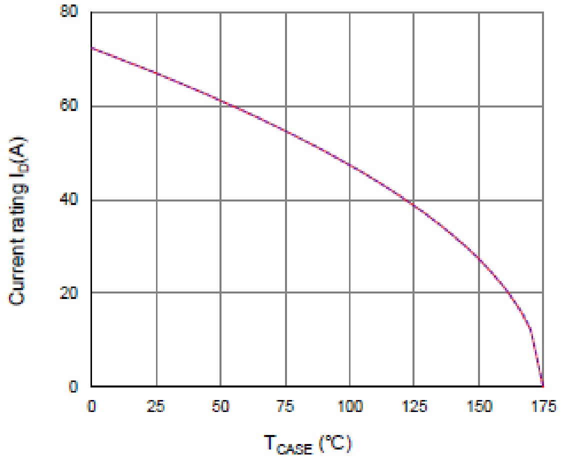


Fig.10 MAXIMUM DRAIN CURRENT VS. CASE TEMPERATURE

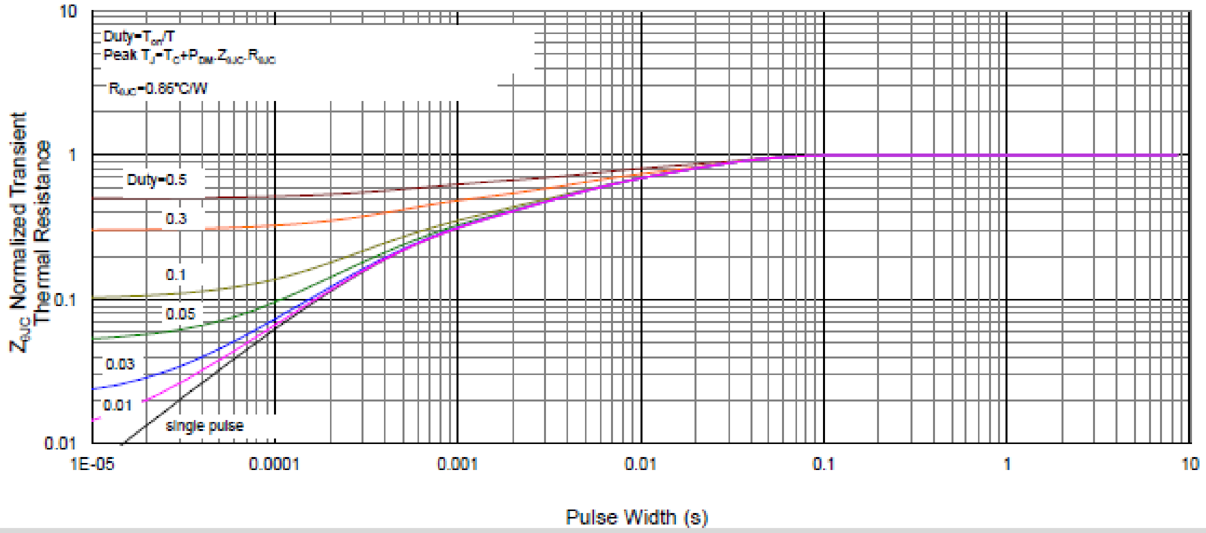
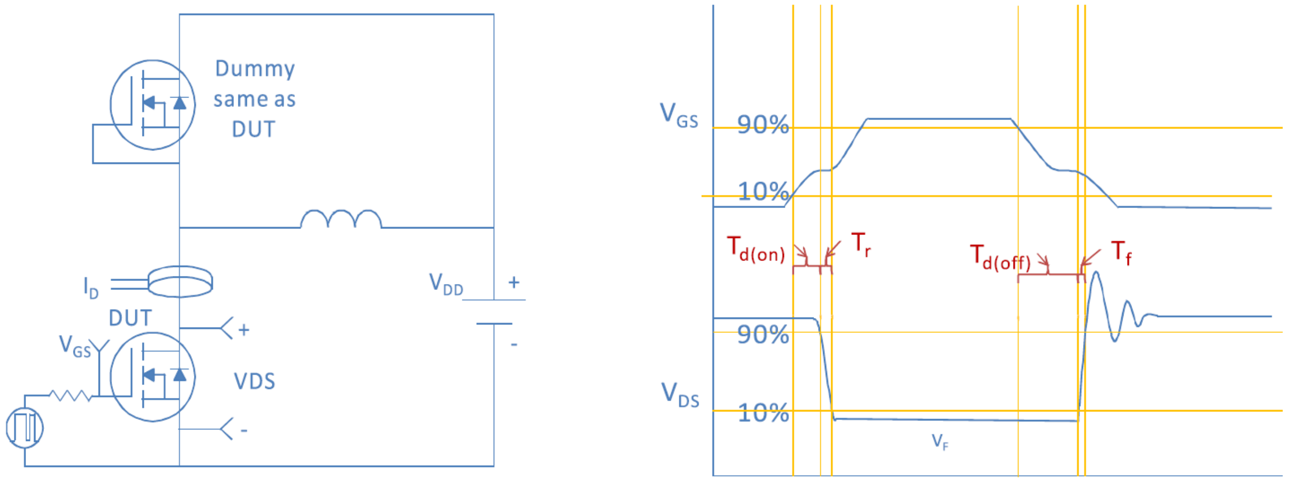
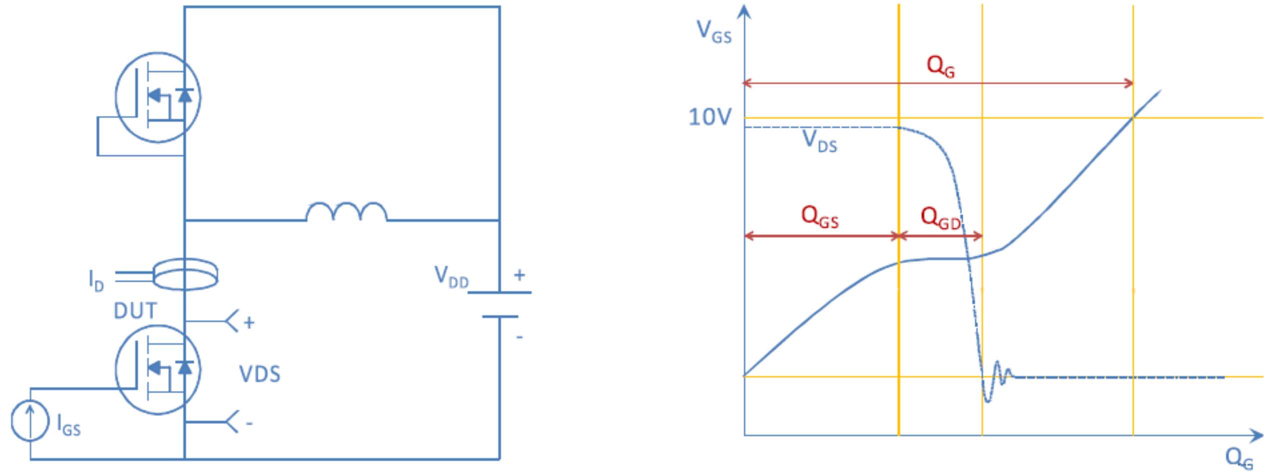


Fig.11 Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

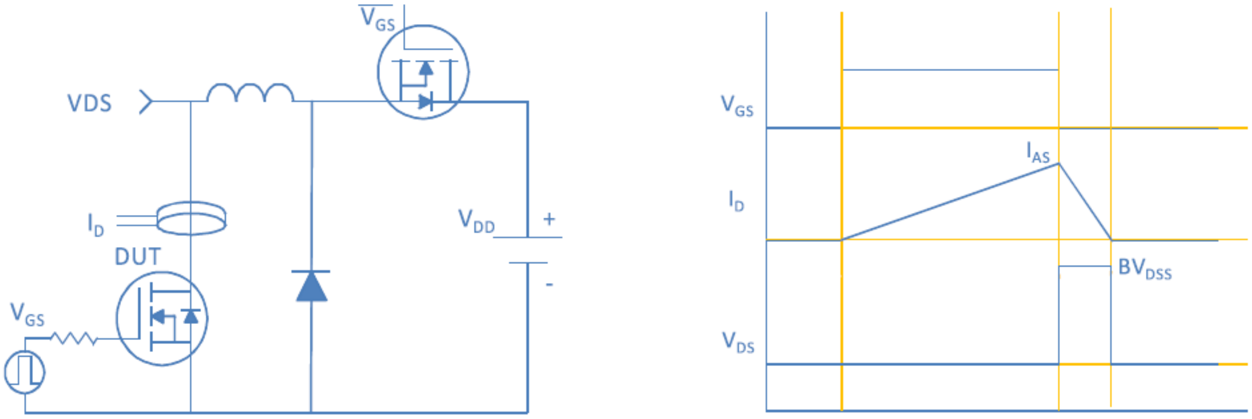
TEST RESULTS CURVES (T_A = 25 °C unless otherwise noted)



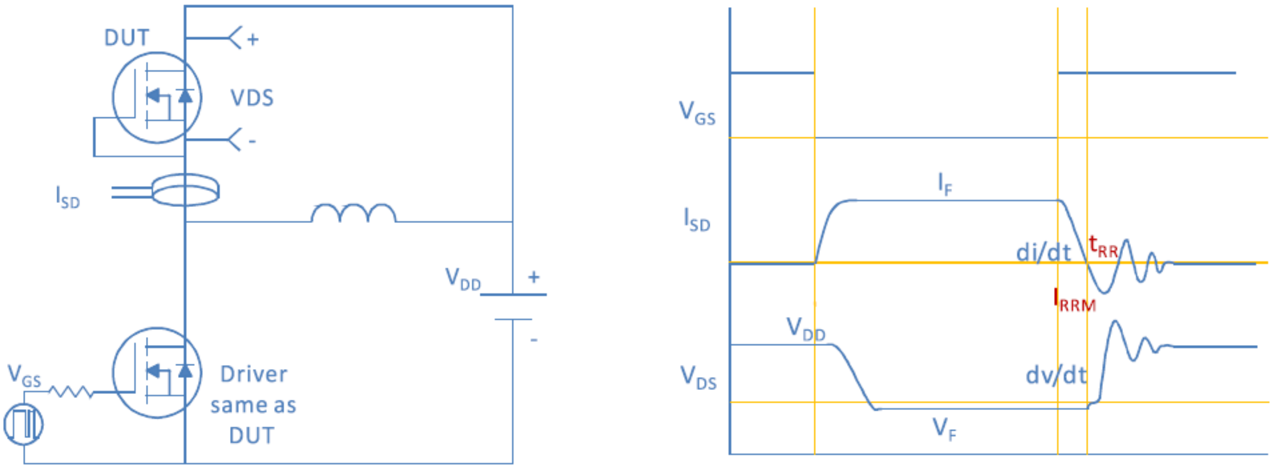
INDUCTIVE SWITCHING TEST



GATE CHARGE TEST



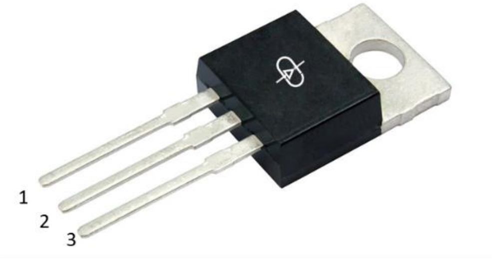
UCLAMPED INDUCTIVE SWITCHING (UIS) TEST

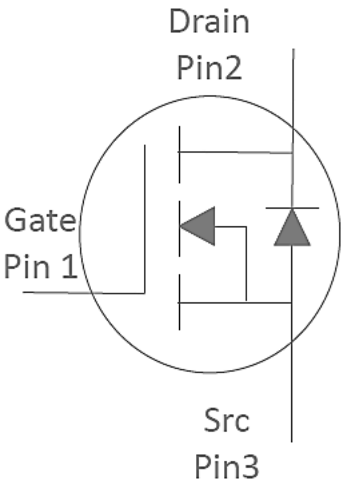


DIODE RECOVERY TEST

PINNING INFORMATION

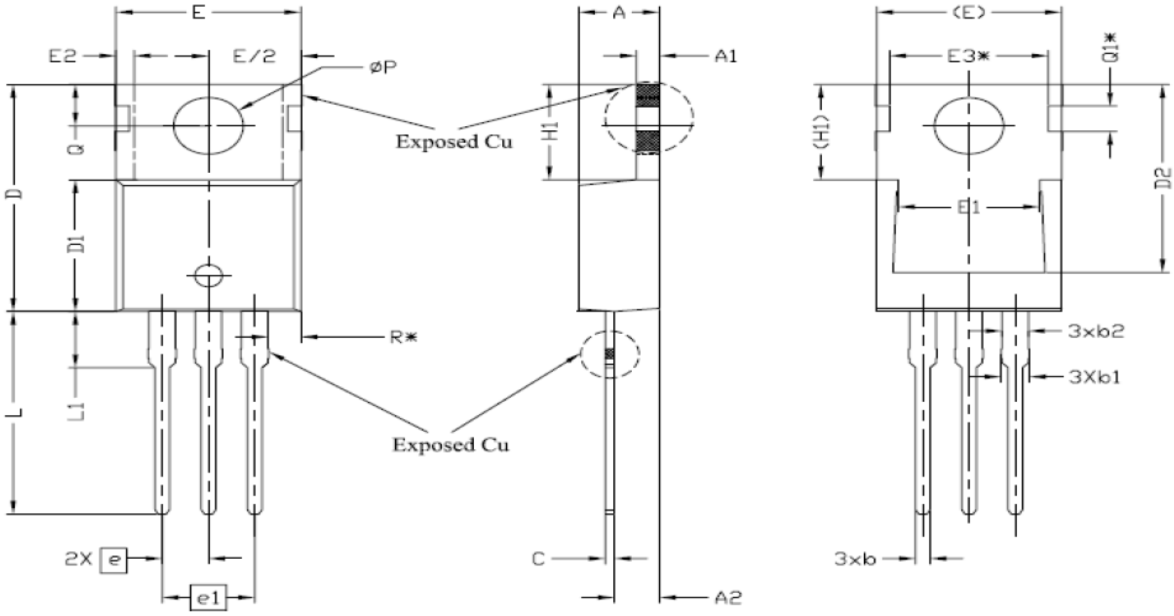
SIMPLIFIED OUTLINE	SYMBOL
TO-220	





PACKAGE INFORMATION

TO-220, 3 Leads

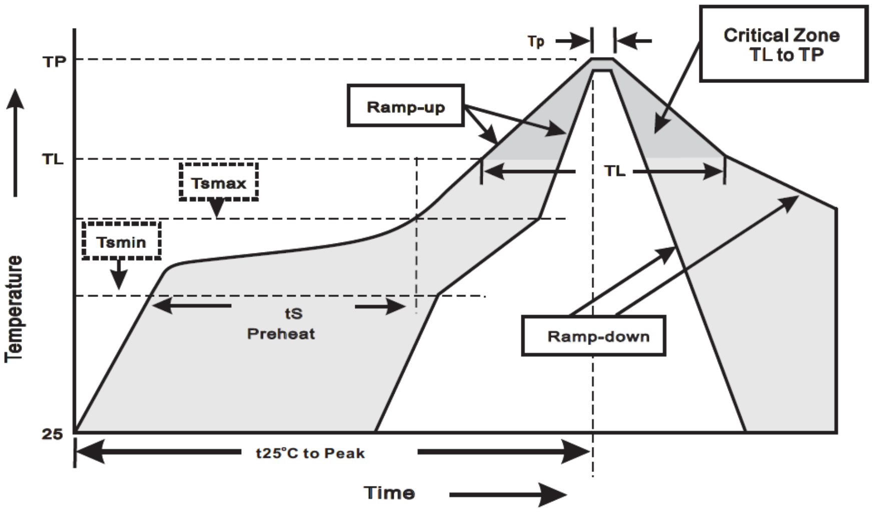


OUTLINE DIMENSIONS						
SYMBOL	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.24	4.44	4.64	0.167	0.175	0.183
A1	1.15	1.27	1.40	0.045	0.050	0.055
A2	2.30	2.48	2.70	0.091	0.098	0.106
b	0.70	0.80	0.90	0.028	0.031	0.035
b1	1.20	1.55	1.75	0.047	0.061	0.069
b2	1.20	1.45	1.70	0.047	0.057	0.067
c	0.40	0.50	0.60	0.016	0.020	0.024
D	14.70	15.37	16.00	0.579	0.605	0.630
D1	8.82	8.92	9.02	0.347	0.351	0.355
D2	12.63	12.73	12.83	0.497	0.501	0.505
E	9.96	10.16	10.36	0.392	0.400	0.408
E1	6.86	7.77	8.89	0.270	0.306	0.350
E2	-	-	0.76	-	-	0.030
E3*	8.70 REF.			0.343 REF.		
e	2.54 REF.			0.100 REF.		
e1	5.08 REF.			0.200 REF.		
H1	6.30	6.45	6.60	0.248	0.254	0.260
L	13.47	13.72	13.97	0.530	0.540	0.550
L1	3.60	3.80	4.00	0.142	0.150	0.157
ΦP	3.75	3.84	3.93	0.148	0.151	0.155
Q	2.60	2.80	3.00	0.102	0.110	0.118
Q1*	1.73 REF.			0.068 REF.		
R*	1.82 REF.			0.072 REF.		

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(tL)	60 ~ 260 sec
Peak Temperature (T_P)	255 °C-0/+5 °C
Time within 5 °C of actual Peak Temperature(tP)	10 ~ 30 sec
Ramp-down Rate	<3 °C/sec
Time 25 °C to Peak Temperature	<6 minutes

CUSTOMER NOTE:

DISCLAIMER

The product information and the selection guide facilitates the selection of the ALPINESEMI™'s Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review the Data sheet(s) so as to confirm that the Device(s) meets functionality parameters for your application. The information furnished on the Data Sheet and the ALPINESEMI™'s Web Site is believed to be accurate and reliable at the time of preparation of this document. ALPINESEMI™ however, does not assume any inaccuracies that may arise when the components are mounted and removed. Furthermore, ALPINESEMI™ does not assume liability whatsoever, arising out of the application or the use of any of ALPINESEMI™'s product(s). Neither, does it convey any license under its patent rights nor the rights of others. These products are not guaranteed for use in life saving/support appliances or systems. ALPINESEMI™'s customers using these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and ALPINESEMI™ will not be responsible in any way(s) for any damage(s) resulting from such use.

Please check the website **www.alpinesemi.com** for continues updates and revision of datasheets.

DESIGN CHANGES: ALPINESEMI™ strives for continuous improvement and reserves the right to change the specifications of its products without prior notice. ALPINESEMI™ reserves the right to discontinue product lines without prior notice. Any product selection is a recommendation based on best understanding of such product(s) by our engineers. However, buyers are advised to rely on their own judgment for such selection of the products.

ALPINESEMI™ makes no warranty, representation or guarantee regarding the suitability of its products for any particular applications. Neither does ALPINESEMI™ assume any liability arising out of the applications nor the use of such products. ALPINESEMI™ specifically disclaims all liabilities either consequential or incidental.

All rights of the product and datasheet are reserved to ALPINESEMI™.

All logos and information provided in the datasheets are for reference only. Any registered and/or trademark/logos belonging to respective companies be the property of those companies. ALPINESEMI™ extends the courtesy to them, if any of the information found in its datasheet.

Component Disposal Instructions

1. ALPINESEMI™ Semiconductor Devices are RoHS compliant and hence customers are requested to dispose as per the prevailing Environmental Legislation put forth in their specific country.

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

ALPINESEMI®

sales@alpinesemi.com
www.alpinesemi.com