45V N-Ch Power MOSFET

Feature

◇ Optimized for high speed switching, Logic Level
◇ Enhanced Body diode dv/dt capability
◇ Enhanced Avalanche Ruggedness
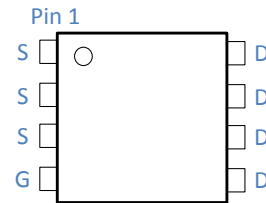◇ 100% UIS Tested, 100% Rg Tested
◇ Lead Free, Halogen Free

Application

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

V_{DS}		45	V
$R_{DS(on),typ}$	V_{GS}=10V	2.5	mΩ
$R_{DS(on),typ}$	V_{GS}=4.5V	3.2	mΩ
$I_{D\ (Sillicon\ Limited)}$		140	A
$I_{D\ (Package\ Limited)}$		60	A

DFN5x6
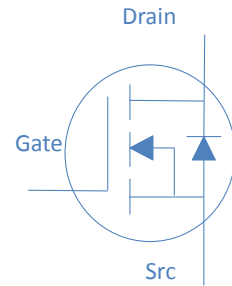
Part Number	Package	Marking
HGN029NE4SL	DFN5x6	GN029NE4SL

Absolute Maximum Ratings at T_j=25℃ (unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	I_D	T_C=25℃	140	A
		T_C=100℃	89	
Continuous Drain Current (Package Limited)		T_C=25℃	60	
Drain to Source Voltage	V_{DS}	-	45	V
Gate to Source Voltage	V_{GS}	-	±20	V
Pulsed Drain Current	I_{DM}	-	350	A
Avalanche Energy, Single Pulse	E_{AS}	L=0.5mH, T_C=25℃	100	mJ
Power Dissipation	P_D	T_C=25℃	104	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to150	℃

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	$R_{\theta JC}$	1.2	℃/W
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	50	℃/W

Electrical Characteristics at T_j=25℃ (unless otherwise specified)

Static Characteristics

Parameter	Symbol	Conditions	Value min	Value typ	Value max	Unit
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	45	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250μA	1	1.4	2.2	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V, V_{DS}=45V, T_j=25℃	-	-	1	μA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V, V_{DS}=45V, T_j=100℃	-	-	100	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=20A	-	2.5	2.9	mΩ
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=20A	-	3.2	4.0	mΩ
Transconductance	g_{fs}	V_{DS}=5V, I_D=20A	-	65	-	S
Gate Resistance	R_G	V_{GS}=0V, V_{DS} Open, f=1MHz	-	1.6	-	Ω

Dynamic Characteristics

Parameter	Symbol	Conditions	min	typ	max	Unit
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, f=1MHz	-	3322	-	pF
Output Capacitance	C_{oss}	V_{GS}=0V, V_{DS}=20V, f=1MHz	-	1367	-	pF
Reverse Transfer Capacitance	C_{rss}	V_{GS}=0V, V_{DS}=20V, f=1MHz	-	96	-	pF
Total Gate Charge (10V)	Q_g (10V)	V_{DD}=20V, I_D=20A, V_{GS}=10V	-	50	-	nC
Total Gate Charge (4.5V)	Q_g (4.5V)	V_{DD}=20V, I_D=20A, V_{GS}=10V	-	25	-	nC
Gate to Source Charge	Q_{gs}	V_{DD}=20V, I_D=20A, V_{GS}=10V	-	8	-	nC
Gate to Drain (Miller) Charge	Q_{gd}	V_{DD}=20V, I_D=20A, V_{GS}=10V	-	9.5	-	nC
Turn on Delay Time	$t_{d(on)}$	V_{DD}=20V, I_D=20A, V_{GS}=10V, R_G=10Ω,	-	14	-	ns
Rise time	t_r	V_{DD}=20V, I_D=20A, V_{GS}=10V, R_G=10Ω,	-	12	-	ns
Turn off Delay Time	$t_{d(off)}$	V_{DD}=20V, I_D=20A, V_{GS}=10V, R_G=10Ω,	-	57	-	ns
Fall Time	t_f	V_{DD}=20V, I_D=20A, V_{GS}=10V, R_G=10Ω,	-	18	-	ns

Reverse Diode Characteristics

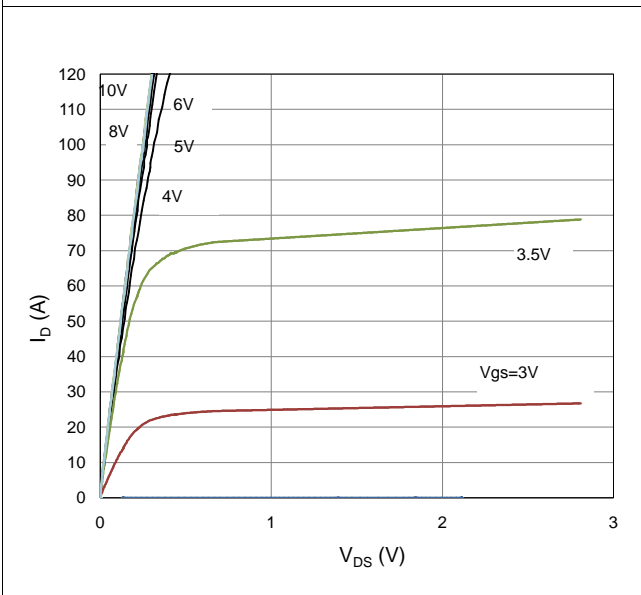| Parameter	Symbol	Conditions	min	typ	max	Unit
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_F=20A	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_R=20V, I_F=20A, dI_F/dt=200A/μs	-	40	-	ns
Reverse Recovery Charge	Q_{rr}	V_R=20V, I_F=20A, dI_F/dt=200A/μs	-	64	-	nC

Fig 1. Typical Output Characteristics

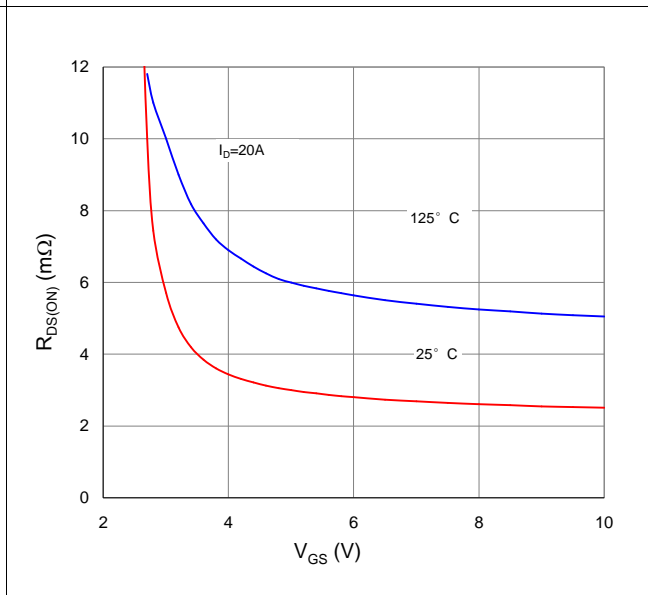Figure 2. On-Resistance vs. Gate-Source Voltage

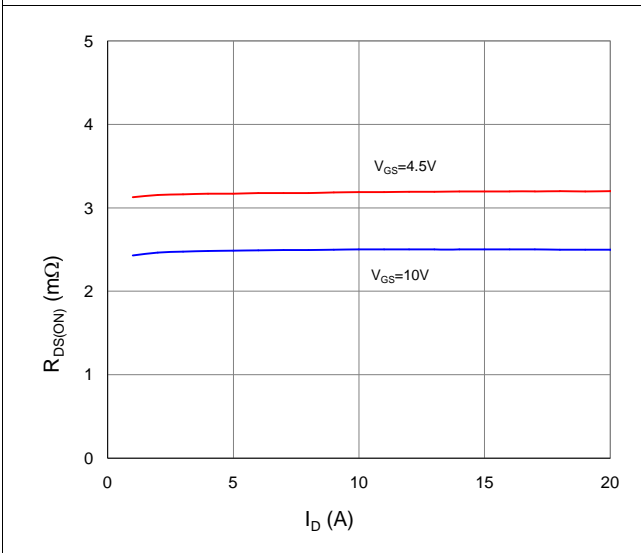Figure 3. On-Resistance vs. Drain Current and Gate Voltage

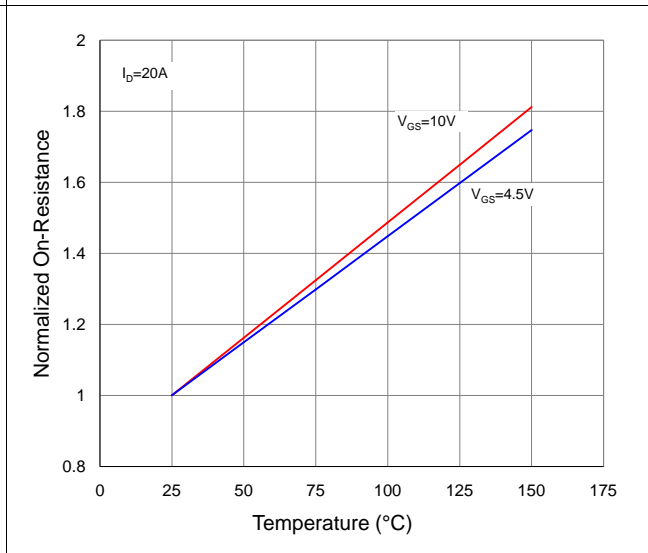Figure 4. Normalized On-Resistance vs. Junction Temperature
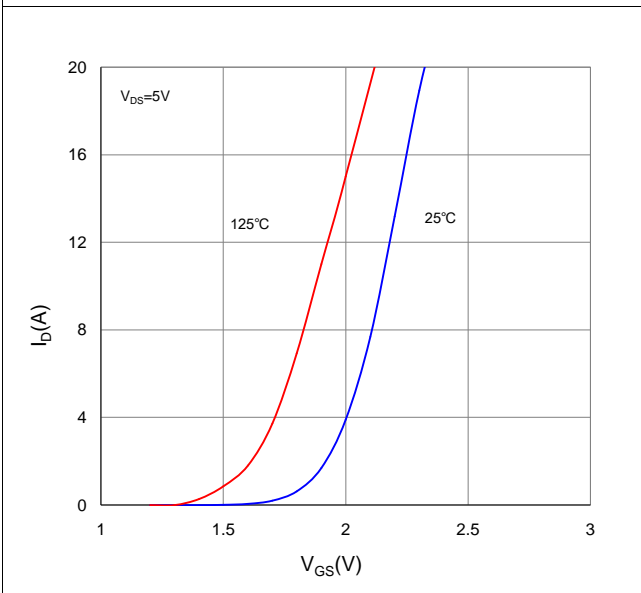

Figure 5. Typical Transfer Characteristics

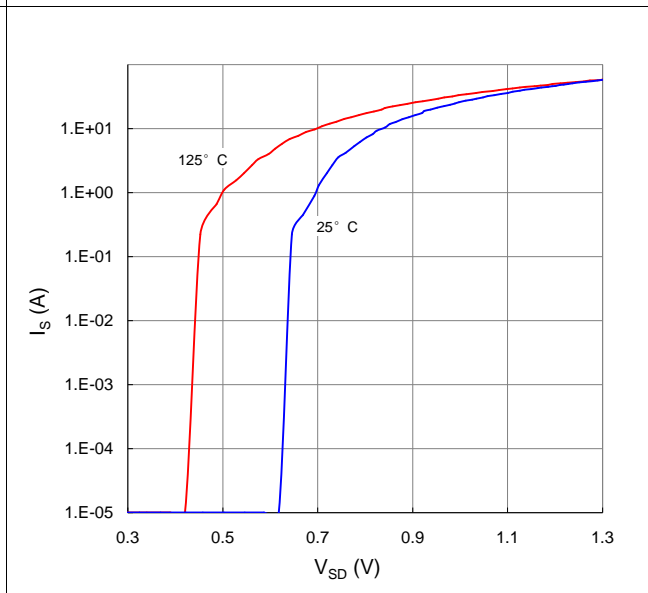Figure 6. Typical Source-Drain Diode Forward Voltage

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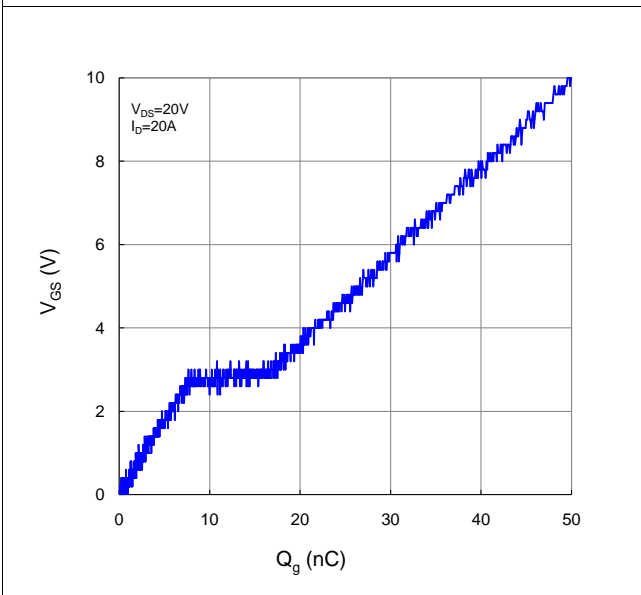
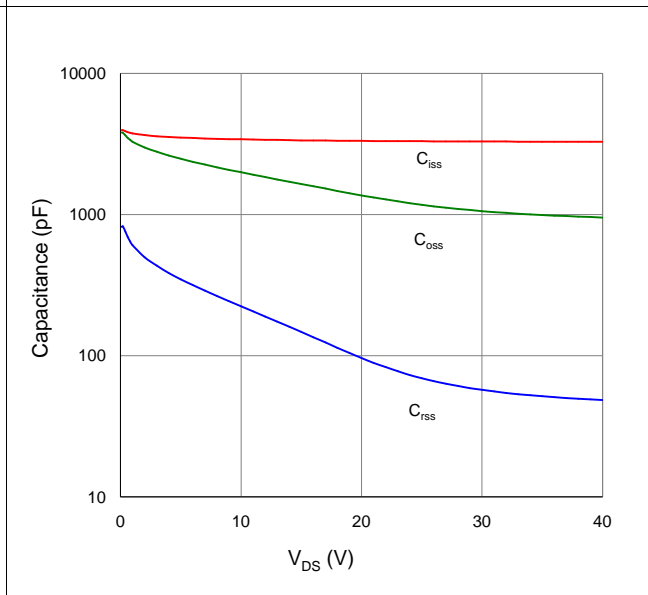Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

Figure 9. Maximum Safe Operating Area
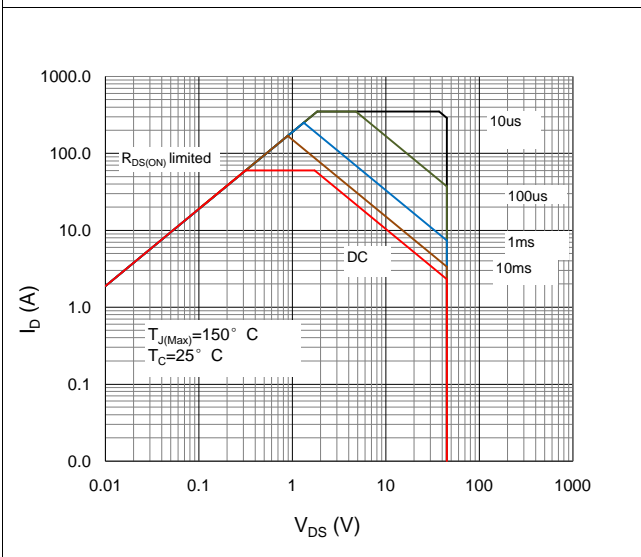
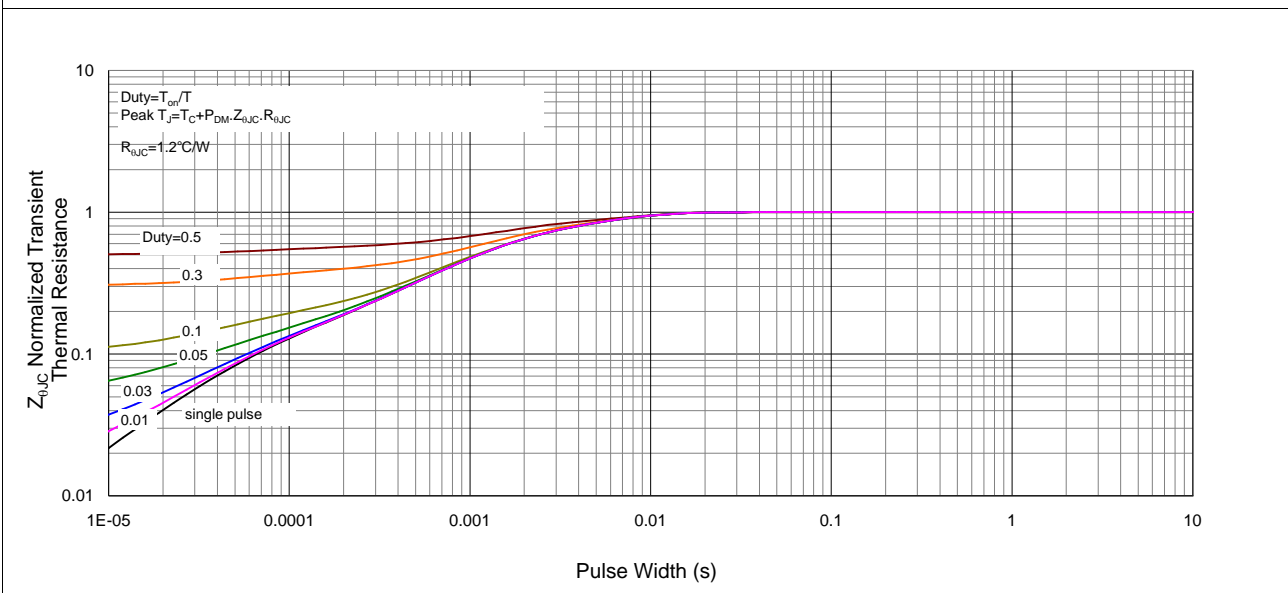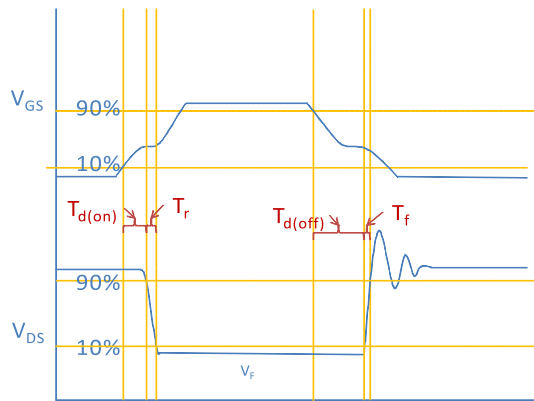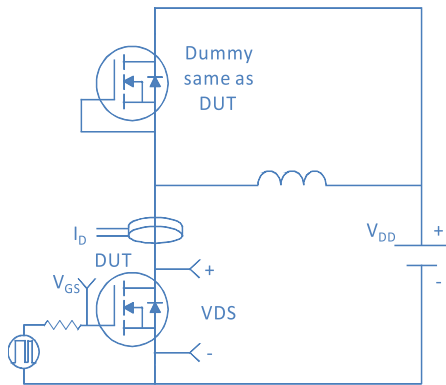Figure 10. Maximun Drain Current vs. Case Temperature
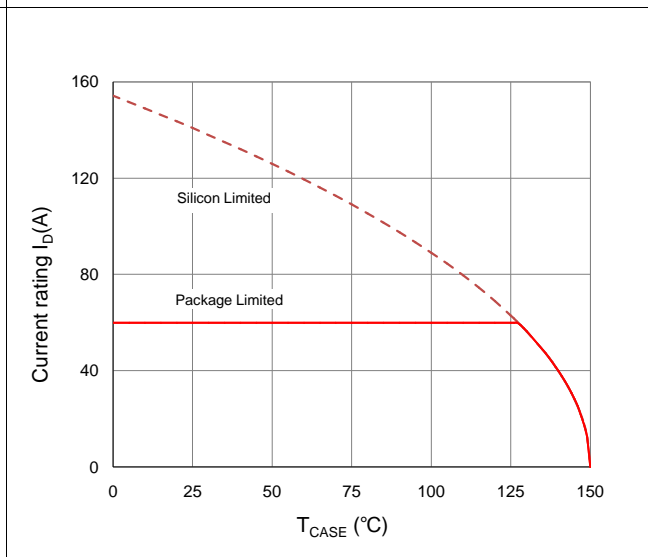
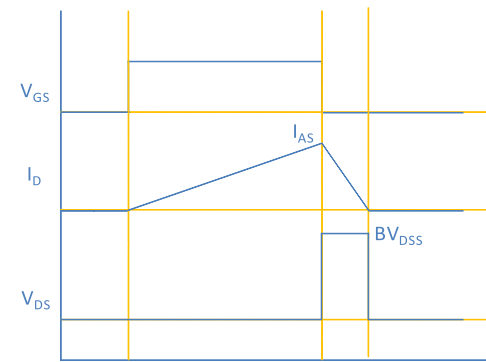Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

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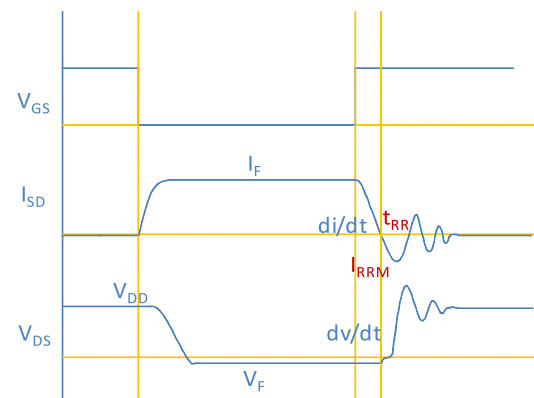Oct.2016

Inductive switching Test

Gate Charge Test
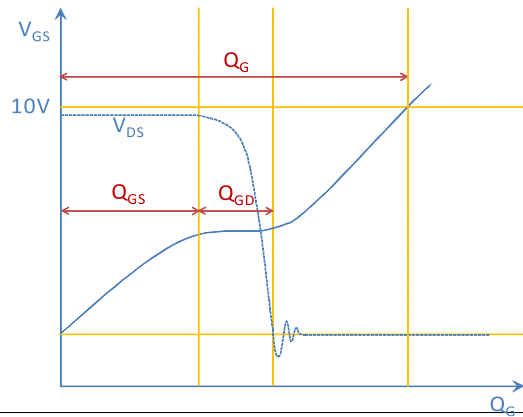
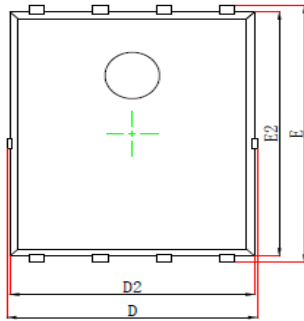

Uclamped Inductive Switching (UIS) Test
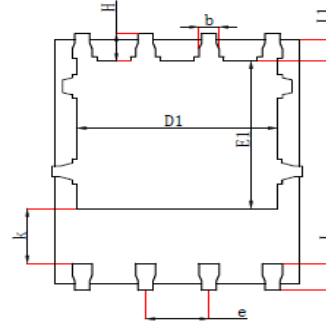

Diode Recovery Test

Package Outline

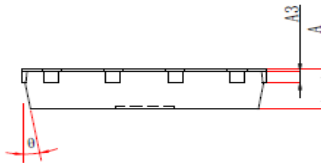## DFN5x6_P, 8 Leads

Top View
[顶视图]

Bottom View
[背视图]

Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A3	0.254 REF		0.010REF	
D	4.680	5.120	0.184	0.202
E	5.900	6.126	0.232	0.241
D1	3.610	4.110	0.142	0.162
E1	3.380	3.780	0.133	0.149
D2	4.800	5.000	0.189	0.197
E2	5.674	5.826	0.223	0.229
k	1.100	1.390	0.043	0.055
b	0.330	0.510	0.013	0.020
e	1.270TYP		1.270TYP	
L	0.510	0.711	0.020	0.028
L1	0.424	0.576	0.017	0.023
H	0.410	0.726	0.016	0.029
θ	0^0	12^0	0^0	12^0