

-20V P-Channel Enhancement Mode MOSFET

Features

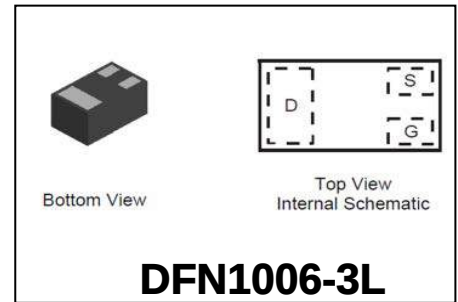
- $V_{DS} = -20V$, $I_D = -2.3A$
 $R_{DS(ON)} < 140m\Omega$ @ $V_{GS} = -4.5V$
 $R_{DS(ON)} < 170m\Omega$ @ $V_{GS} = -2.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Applications

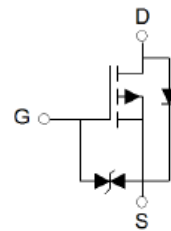
- PWM Applications
- Load Switch
- Power Management

Order Information

Product	Package	Marking	Packing
AM20NP025T	DFN1006-3L	39	10000PCS/Reel



Equivalent Circuit



Absolute Maximum Ratings

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		± 12	V
I_D	Continuous Drain Current	$T_A = 25^\circ C$	-2.3	A
		$T_A = 100^\circ C$	-1.6	
I_{DM}	Pulsed Drain Current ^{note1}		-10	A
P_D	Power Dissipation	$T_A = 25^\circ C$	1	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		125	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	$^\circ C$

Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} = 0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.4	-0.7	-1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} =-4.5V, I _D =-2.3A	-	115	140	mΩ
		V _{GS} =-2.5V, I _D =-1.5A	-	140	170	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz	-	248	-	pF
C _{oss}	Output Capacitance		-	42	-	pF
C _{rss}	Reverse Transfer Capacitance		-	31	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -2.5A, V _{GS} = -4.5V	-	2.9	-	nC
Q _{gs}	Gate-Source Charge		-	0.45	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	0.75	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, R _L =5Ω, R _{GEN} =3Ω,V _{GS} =-4.5V,	-	9.8	-	ns
t _r	Turn-on Rise Time		-	4.9	-	ns
t _{d(off)}	Turn-off Delay Time		-	20.5	-	ns
t _f	Turn-off Fall Time		-	7	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-2.5	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-10	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -2.5A	-	-	-1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

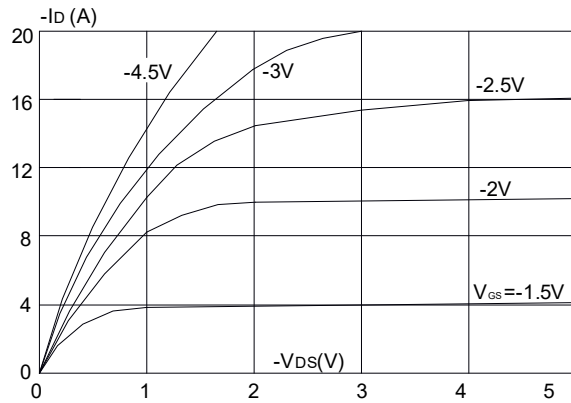


Figure 2: Typical Transfer Characteristics

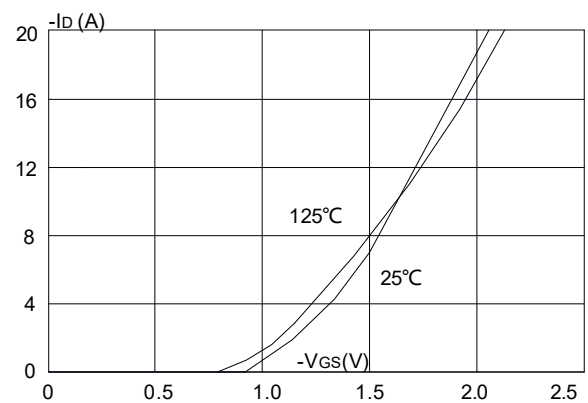


Figure 3: On-resistance vs. Drain Current

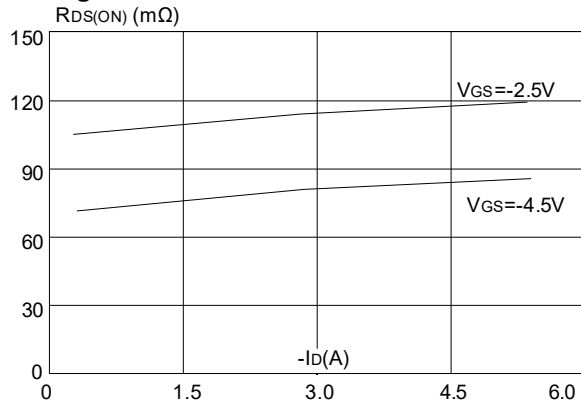


Figure 4: Body Diode Characteristics

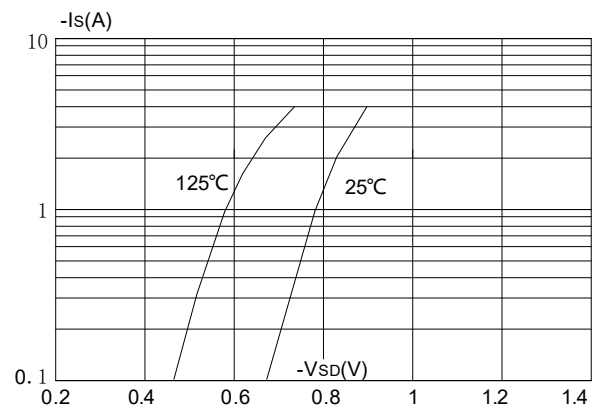


Figure 5: Gate Charge Characteristics

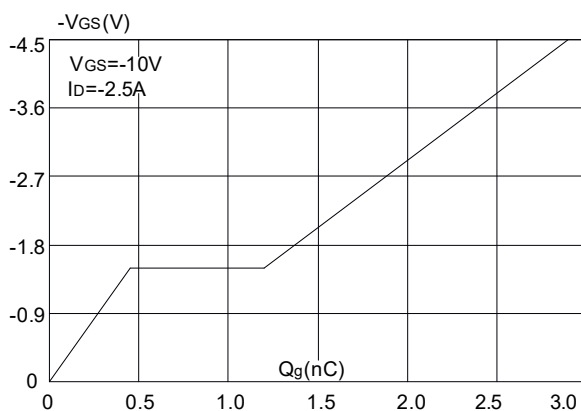
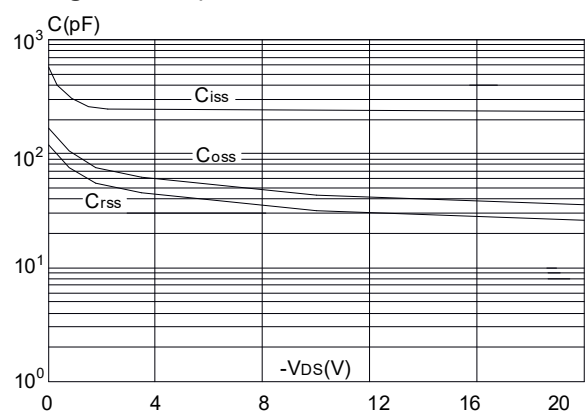


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

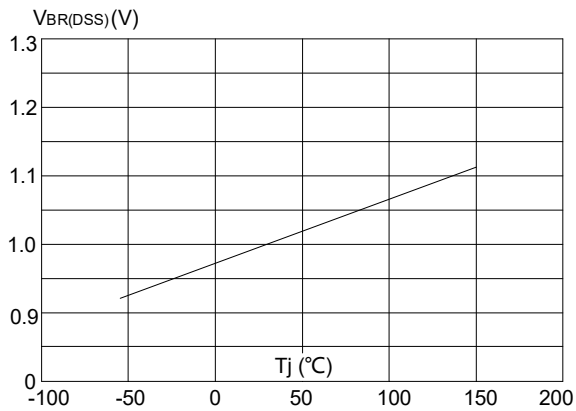


Figure 8: Normalized on Resistance vs. Junction Temperature

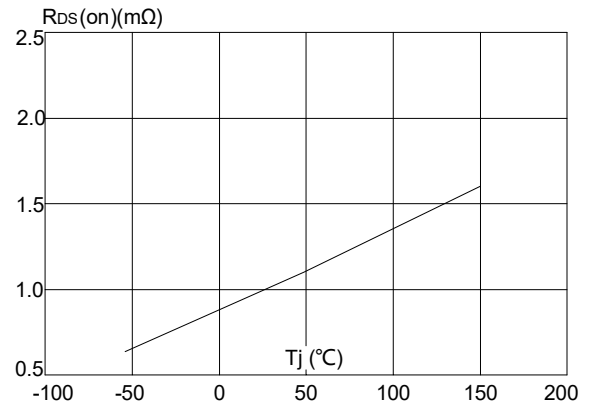


Figure 9: Maximum Safe Operating Area

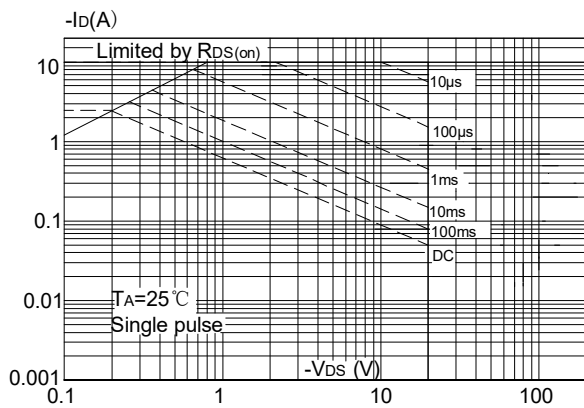


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

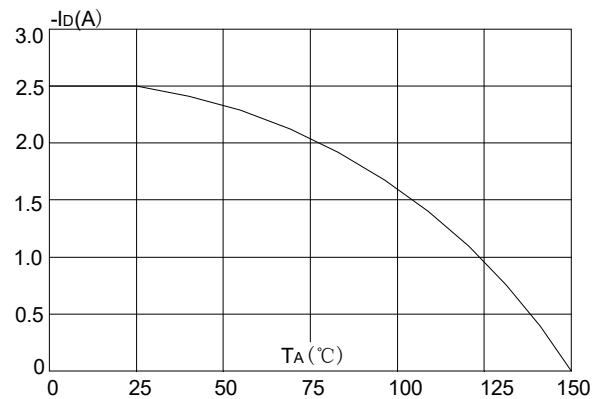
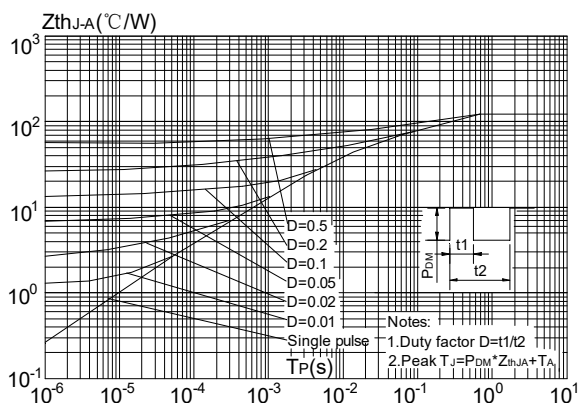
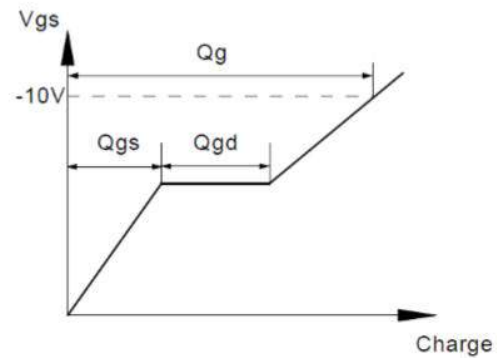
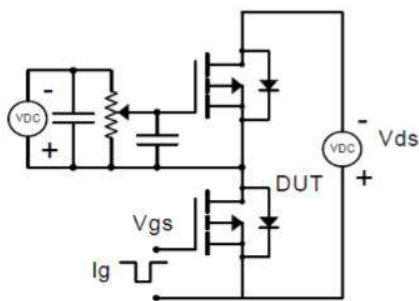


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

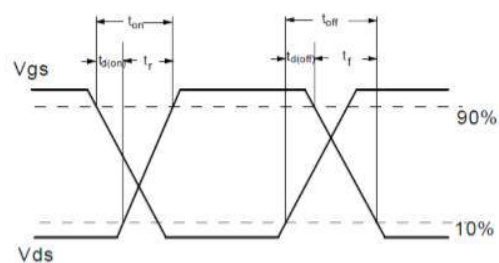
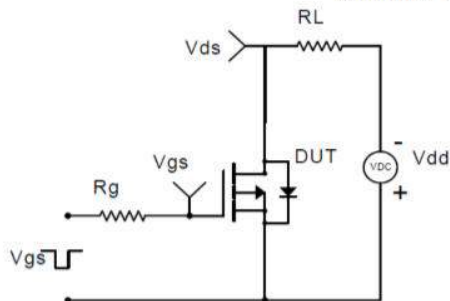


Test Circuit

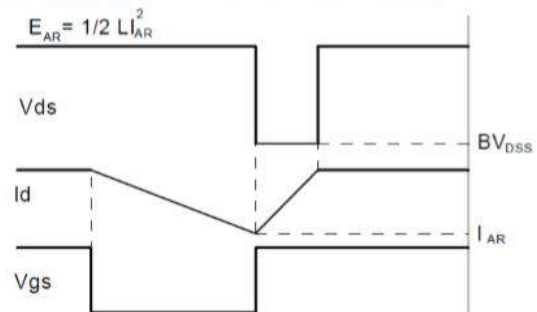
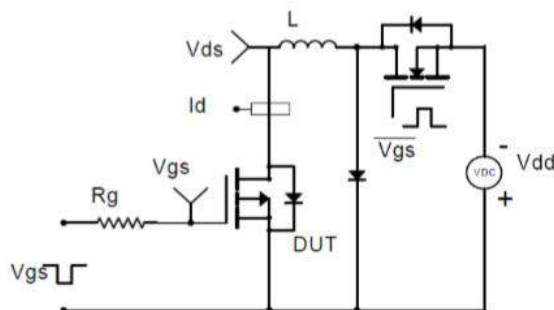
Gate Charge Test Circuit & Waveform



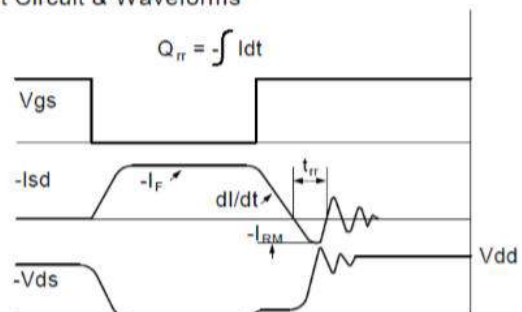
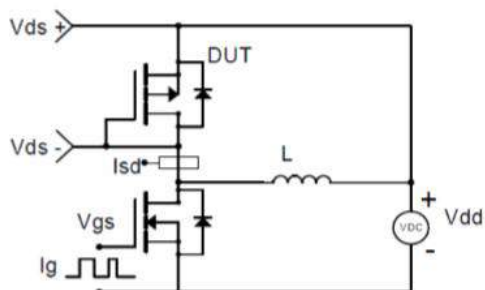
Resistive Switching Test Circuit & Waveforms

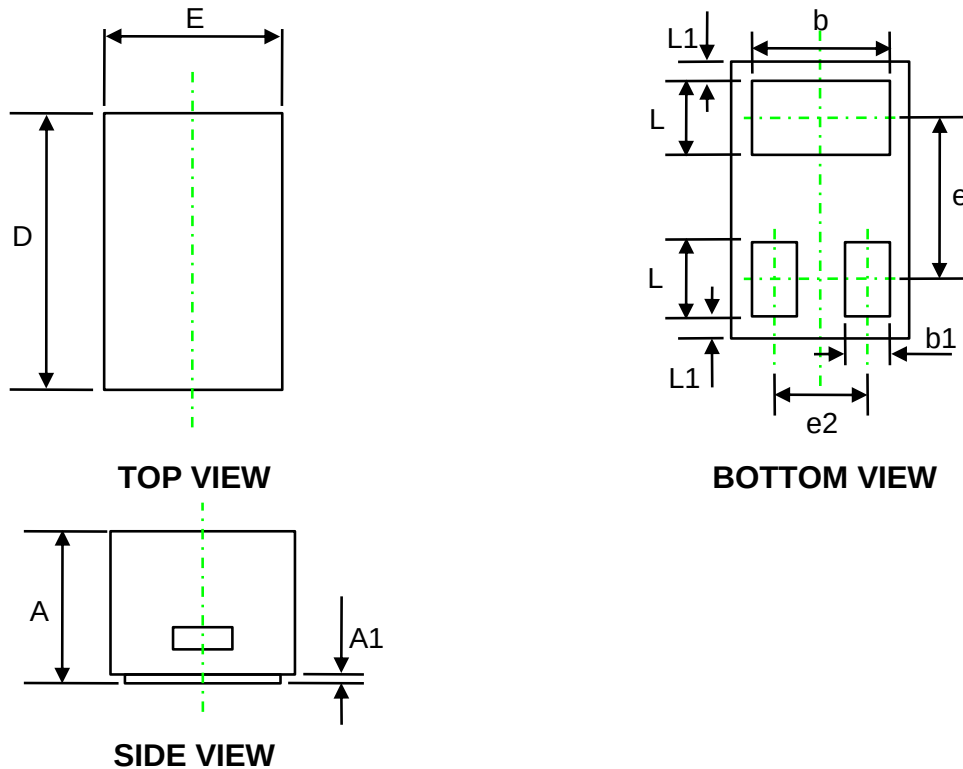


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

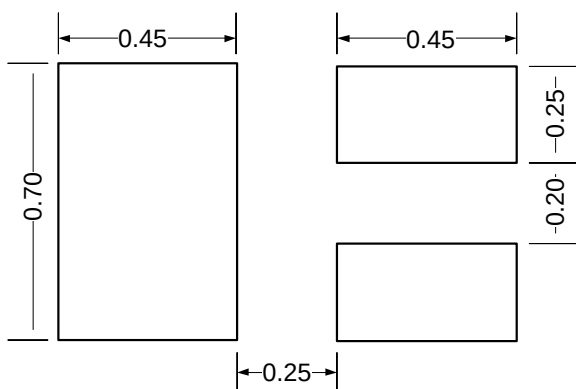


Diode Recovery Test Circuit & Waveforms



DFN1006-3L Package Outline Dimensions


Symbol	Dimensions In Millimeters (mm)		
	Min.	Typ.	Max.
A	0.44	0.47	0.55
A1	0.00	0.03	0.05
D	0.95	1.00	1.05
E	0.55	0.60	0.65
b	0.45	0.50	0.55
e	-	0.65	-
e2	-	0.35	-
L1	0.05 REF.		
L	0.20	0.25	0.30
b1	0.10	0.15	0.20

Recommended Mounting Pad Layout Unit:mm

Notes:

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.