

40V N and P-CHANNEL ENHANCEMENT MODE POWER MOSFET 40V N + P 沟道增强型 MOS 管

**N-Channel  $V_{DS}= 40V$**

**$R_{DS(ON)}, V_{GS}@10V, I_{DS}@8.8A = 26.5m\Omega$**

**$R_{DS(ON)}, V_{GS}@4.5V, I_{DS}@5.0A = 45.0m\Omega$**

**P-Channel  $V_{DS}= - 40V$**

**$R_{DS(ON)}, V_{GS}@-10V, I_{DS}@- 7.3A = 42.0m\Omega$**

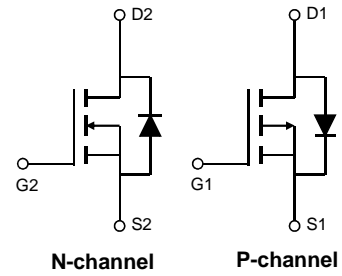
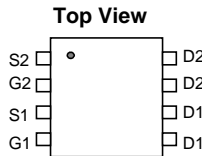
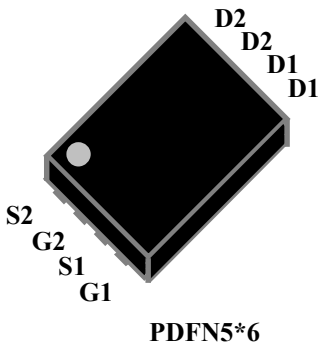
**$R_{DS(ON)}, V_{GS}@- 4.5V, I_{DS}@- 4.9A = 70.0m\Omega$**

**Features 特性**

Advanced trench process technology 高级的加工技术

High Density Cell Design For Ultra Low On-Resistance 极低的导通电阻高密度的单元设计

Package Dimensions 外形图



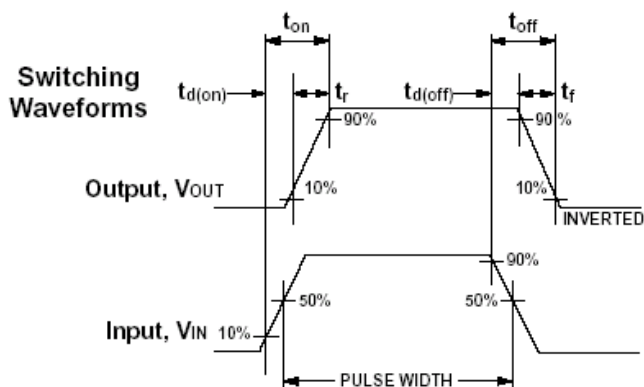
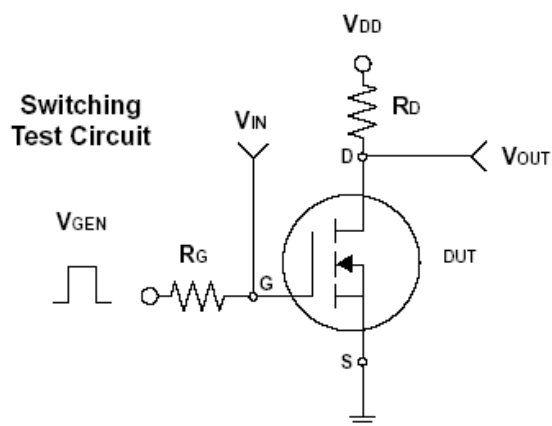
**Maximum Ratings and Thermal Characteristics (TA =25°C unless otherwise noted) 25°C 极限参数和热特性**

Parameter 极限参数	Symbol 符号	Ratings 等级		Unit 单位
		N-沟道	P-沟道	
Drain-Source Voltage 漏源电压	$V_{DS}$	40	-40	V
Gate-Source Voltage 栅源电压	$V_{GS}$	±20	±20	V
Continuous Drain Current 连续漏极电流	$I_D$	8.8	-7.3	A
Pulsed Drain Current 脉冲漏极电流	$I_{DM}$	30	-30	A
Total Power Dissipation 功耗	$P_D @TA=25^\circ C$	3.1	3.2	W
Total Power Dissipation 功耗	$P_D @TA=75^\circ C$	2.0	2.1	W
Operating Junction and Storage Temperature Range 使用及储存温度	$T_J, T_{stg}$	-55 ~ +150		°C
Junction-to-Ambient Thermal Resistance (PCB mounted) 结环热阻	$T_j, T_{stg}$	62.5		W/°C

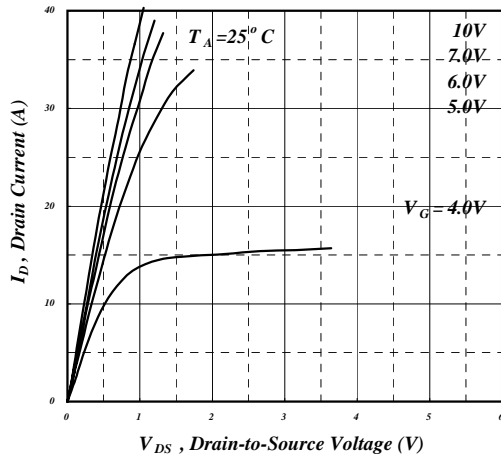
N-Channel Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified) N 沟道电气特性 25°C

Parameter 参数	符号	Test Condition 测试条件	最小值	典型值	最大值	单位
<b>Static 静态参数</b>						
Drain-Source Breakdown Voltage 漏源击穿电压	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	40			V
Drain-Source On-State Resistance 漏源导通电阻	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5.0A		30	45	mΩ
Drain-Source On-State Resistance 漏源导通电阻	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.0A		21	26.5	
Gate Threshold Voltage 开启电压	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1	1.65	3	V
Zero Gate Voltage Drain Current 零栅压漏极电流	I <sub>DSS</sub>	V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V			10	μA
Gate Body Leakage 漏极短路时截止栅电流	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±30	nA
Gate Resistance 栅极电阻	R <sub>g</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V at 1.0MHz		2.2	4.4	Ω
Forward Transconductance 正向跨导	g <sub>fs</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 6A		15		S
<b>Dynamic 动态参数</b>						
Total Gate Charge 栅极总电荷	Q <sub>g</sub>	V <sub>DS</sub> = 20V, I <sub>D</sub> = 8A V <sub>GS</sub> = 10V		15		nC
Gate-Source Charge 栅-源极电荷	Q <sub>gs</sub>			1.4		
Gate-Drain Charge 栅-漏极电荷	Q <sub>gd</sub>			3.7		
Turn-On Delay Time 导通延迟时间	t <sub>d(on)</sub>	V <sub>DS</sub> = 20V, R <sub>L</sub> = 10 Ω I <sub>D</sub> = 1A, V <sub>GS</sub> = 10V R <sub>G</sub> = 3.0 Ω		10		ns
Turn-On Rise Time 导通上升时间	t <sub>r</sub>			5.1		
Turn-Off Delay Time 关断延迟时间	t <sub>d(off)</sub>			37.8		
Turn-Off Fall Time 关断下降时间	t <sub>f</sub>			5.6		
Input Capacitance 输入电容	C <sub>iss</sub>	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V f = 1.0 MHz		748		pF
Output Capacitance 输出电容	C <sub>oss</sub>			65.5		
Reverse Transfer Capacitance 反向传输电容	C <sub>rss</sub>			52		
<b>Source-Drain Diode 源漏二极管参数</b>						
Max. Diode Forward Current 最大正向电流	I <sub>S</sub>				8	A
Diode Forward Voltage 正向电压	V <sub>SD</sub>	I <sub>S</sub> = 1.0A, V <sub>GS</sub> = 0V			1	V

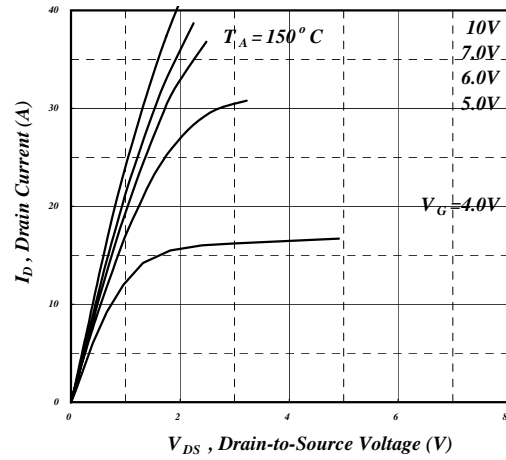
Note: Pulse test: pulse width ≤ 300us, duty cycle ≤ 2% 注意: 脉冲测试: 脉冲宽度 ≤ 300us 死区 ≤ 2%



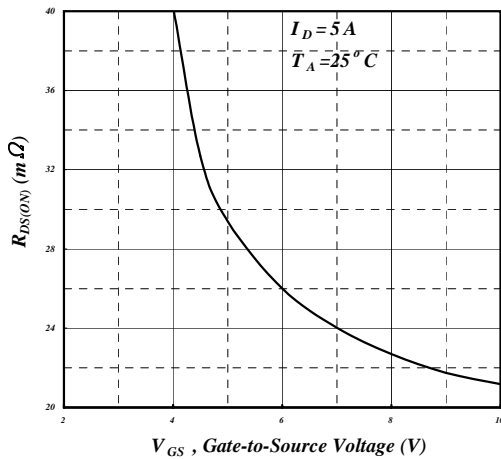
N-Channel Characteristics Curve N 沟道电气性能特征曲线



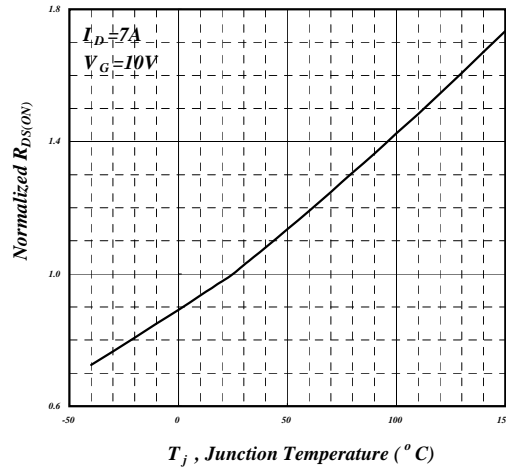
**Fig 1. Typical Output Characteristics**



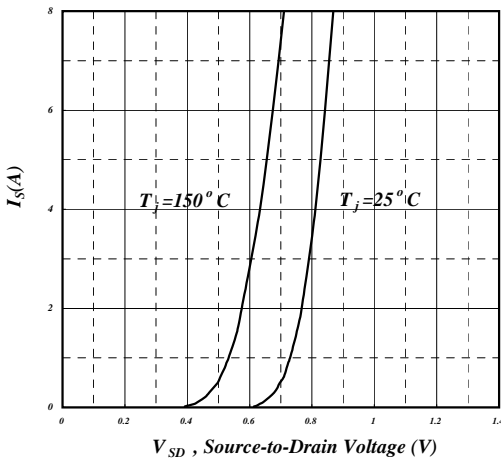
**Fig 2. Typical Output Characteristics**



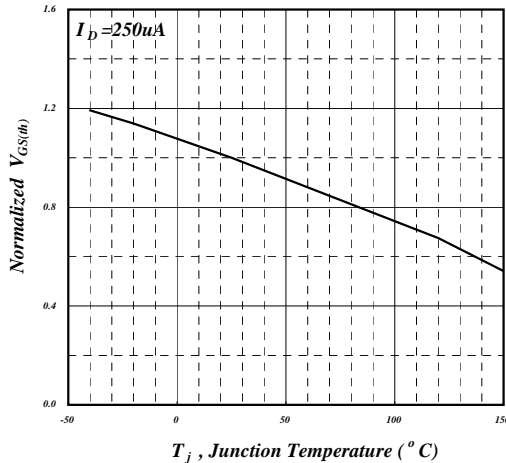
**Fig 3. On-Resistance v.s. Gate Voltage**



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



**Fig 5. Forward Characteristic of Reverse Diode**



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

P-Channel Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified) P 沟道电气特性 25°C

Parameter 参数	符号	Test Condition 测试条件	最小值	典型值	最大值	单位
<b>Static 静态参数</b>						
Drain-Source Breakdown Voltage 漏源击穿电压	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250uA	-40			V
Drain-Source On-State Resistance 漏源导通电阻	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.0A		50	70	mΩ
Drain-Source On-State Resistance 漏源导通电阻	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -5.0A		38	42	
Gate Threshold Voltage 栅源电压	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250uA	-1	-1.65	-3	V
Zero Gate Voltage Drain Current 零栅压漏极电流	I <sub>DSS</sub>	V <sub>DS</sub> = -32V, V <sub>GS</sub> = 0V			-10	uA
Gate Body Leakage 漏极短路时截止栅电流	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±30	nA
Gate Resistance 栅极电阻	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		6.5	12	Ω
Forward Transconductance 正向跨导	g <sub>fs</sub>	V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A		12		S
<b>Dynamic 动态参数</b>						
Total Gate Charge 栅极总电荷	Q <sub>g</sub>	V <sub>DS</sub> = -20V, I <sub>D</sub> = -8A V <sub>GS</sub> = -10V		21.8		nC
Gate-Source Charge 栅-源极电荷	Q <sub>gs</sub>			2.4		
Gate-Drain Charge 栅-漏极电荷	Q <sub>gd</sub>			5.0		
Turn-On Delay Time 导通延迟时间	t <sub>d(on)</sub>	V <sub>DS</sub> = -20V, R <sub>L</sub> = 10 Ω I <sub>D</sub> = -5A, V <sub>GS</sub> = -10V R <sub>G</sub> = 3.0 Ω		14.9		ns
Turn-On Rise Time 导通上升时间	t <sub>r</sub>			6.7		
Turn-Off Delay Time 关断延迟时间	t <sub>d(off)</sub>			45.4		
Turn-Off Fall Time 关断下降时间	t <sub>f</sub>			9.8		
Input Capacitance 输入电容	C <sub>iss</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V f = 1.0 MHz		1233		pF
Output Capacitance 输出电容	C <sub>oss</sub>			98		
Reverse Transfer Capacitance 反向传输电容	C <sub>rss</sub>			68		
<b>Source-Drain Diode 源漏二极管参数</b>						
Max. Diode Forward Current 最大正向电流	I <sub>S</sub>				-8	A
Diode Forward Voltage 正向电压	V <sub>SD</sub>	I <sub>S</sub> = -1.0A, V <sub>GS</sub> = 0V			-1	V

P-Channel

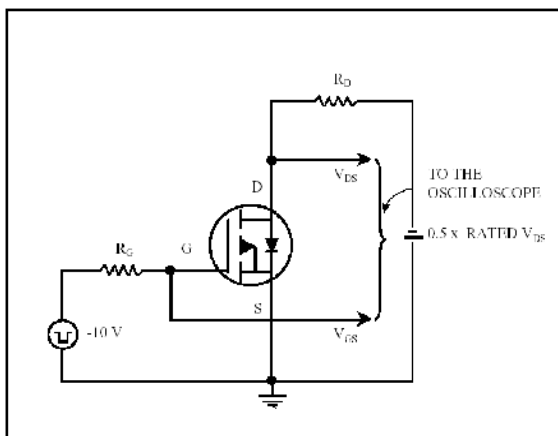


Fig 13. Switching Time Circuit

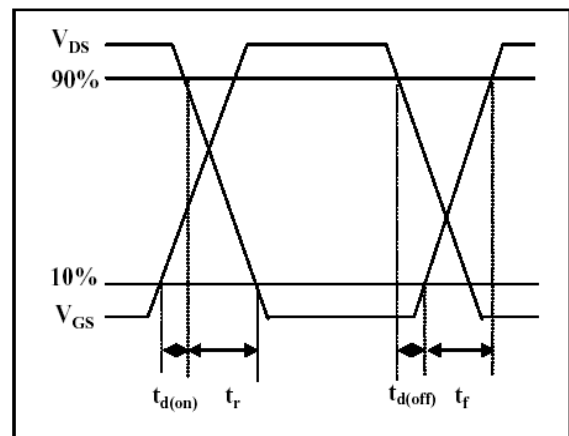
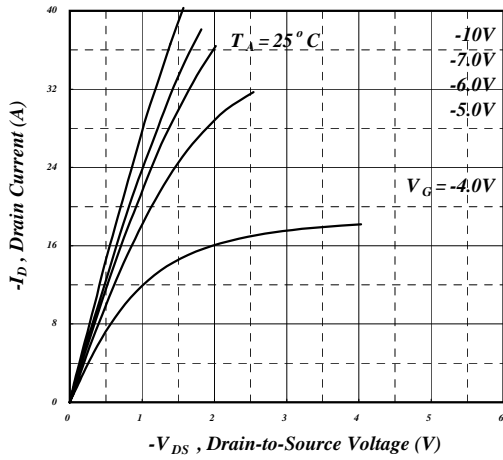
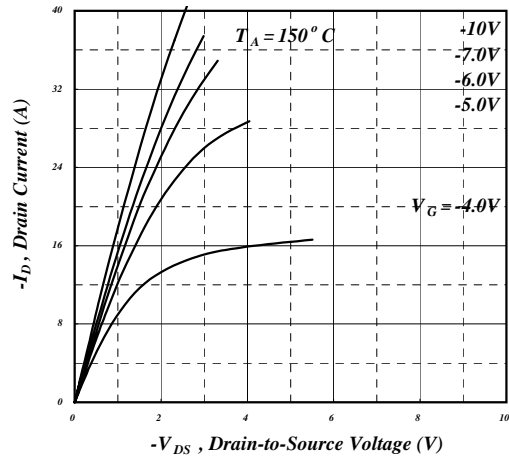


Fig 14. Switching Time Waveform

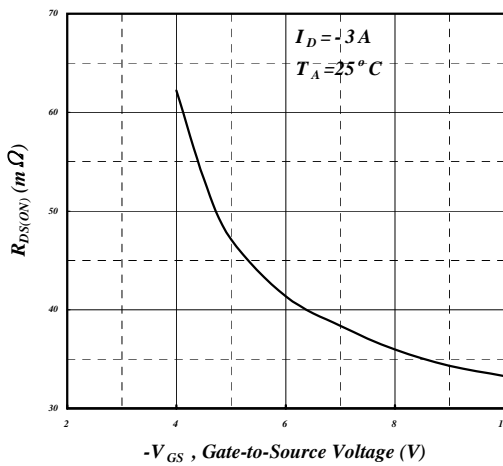
**P-Channel Characteristics Curve P 沟道电气性能特征曲线**



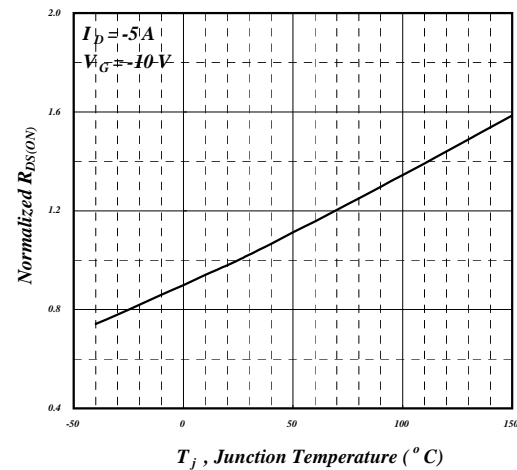
**Fig 1. Typical Output Characteristics**



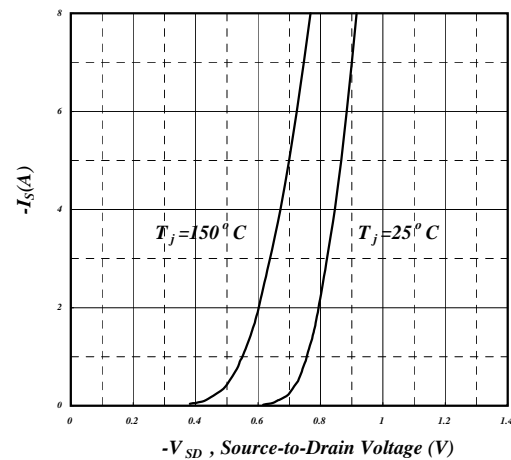
**Fig 2. Typical Output Characteristics**



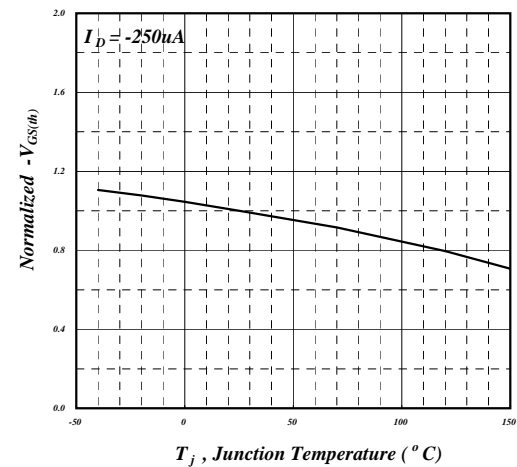
**Fig 3. On-Resistance v.s. Gate Voltage**



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

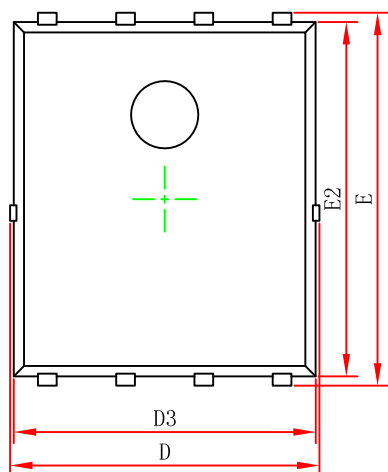


**Fig 5. Forward Characteristic of Reverse Diode**

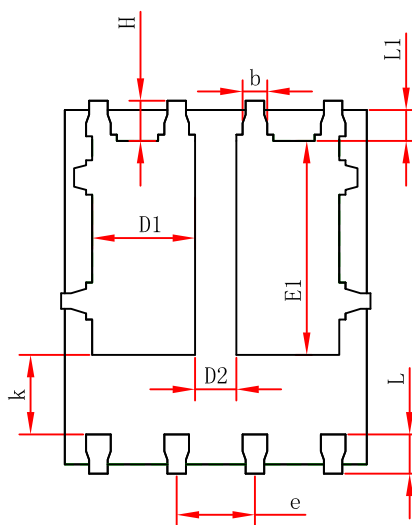


**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

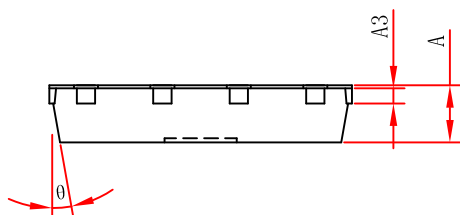
**Package PDFN5\*6 Information**



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	1.000	0.035	0.039
A3	0.254 REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°