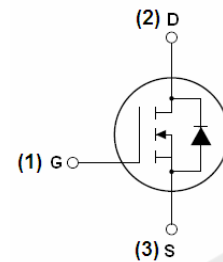
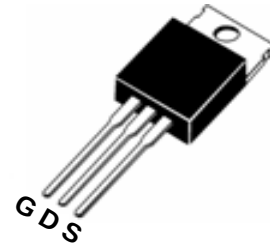




PIN Connection TO-220AB



Description

The FIR140N075PG uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = 75V, I_D = 140A$
 $R_{DS(ON)} < 5.5m\Omega @ V_{GS} = 10V$ (Typ: 5.1m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

Marking Diagram



Y = Year
A = Assembly Location
WW = Work Week
FIR140N075P = Specific Device Code

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FIR140N075P	FIR140N075PG	TO-220	-	-	-

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	75	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	140	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	97	A
Pulsed Drain Current	I_{DM}	550	A
Maximum Power Dissipation	P_D	260	W
Derating factor		1.73	W/°C
Single pulse avalanche energy (Note 5)	E_{AS}	1200	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

**Thermal Characteristic**

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	0.58	$^{\circ}\text{C/W}$
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Electrical Characteristics (TA=25 $^{\circ}\text{C}$ unless otherwise noted)

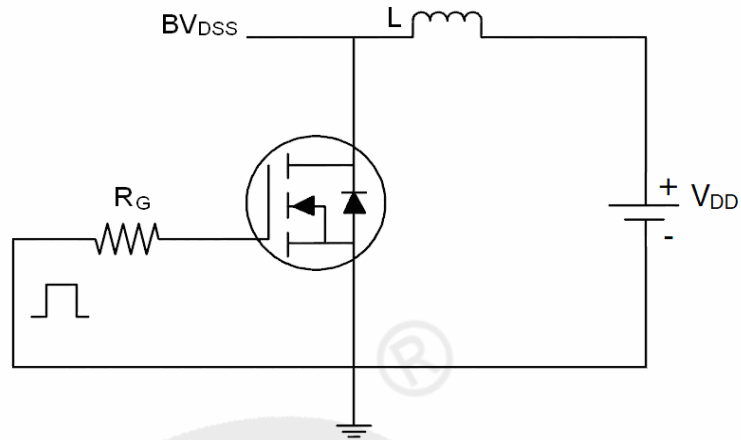
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	75		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =75V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2		4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	5.1	5.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =15V,I _D =70A	160	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =50V,V _{GS} =0V, F=1.0MHz	-	7650	-	PF
Output Capacitance	C _{oss}		-	540	-	PF
Reverse Transfer Capacitance	C _{rss}		-	250	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V,I _D =40A V _{GS} =10V,R _{GEN} =2.5Ω	-	25	-	nS
Turn-on Rise Time	t _r		-	100	-	nS
Turn-Off Delay Time	t _{d(off)}		-	65	-	nS
Turn-Off Fall Time	t _f		-	77	-	nS
Total Gate Charge	Q _g	V _{DS} =44V,I _D =40A, V _{GS} =10V	-	120	-	nC
Gate-Source Charge	Q _{gs}		-	30	-	nC
Gate-Drain Charge	Q _{gd}		-	40	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =40A	-	0.85	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	40	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 40A di/dt = 100A/μs(Note3)	-	45	70	nS
Reverse Recovery Charge	Q _{rr}		-	80	120	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

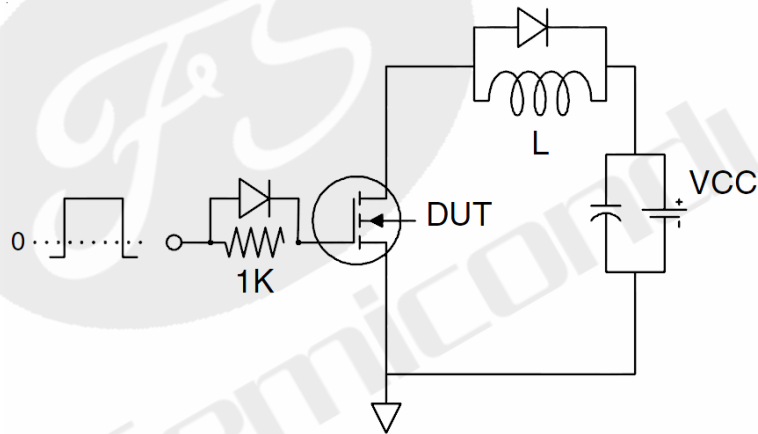
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=1mH, R_g=25\Omega$

Test circuit

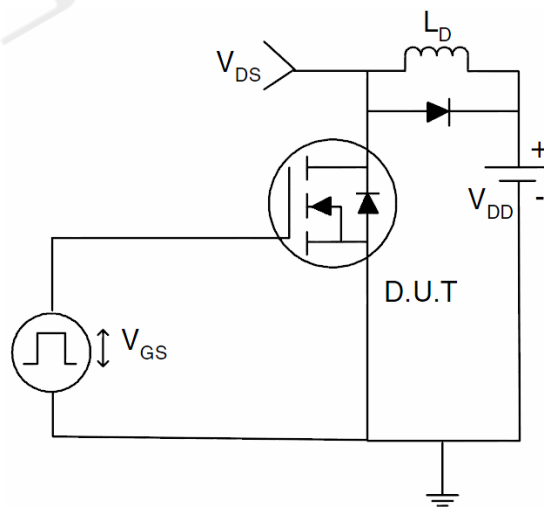
1) E_{AS} test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:





Typical Electrical And Thermal Characteristics(Curves)

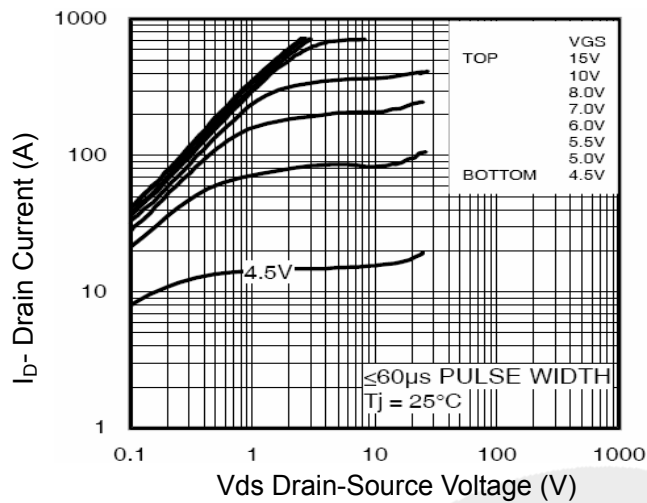


Figure 1 Output Characteristics

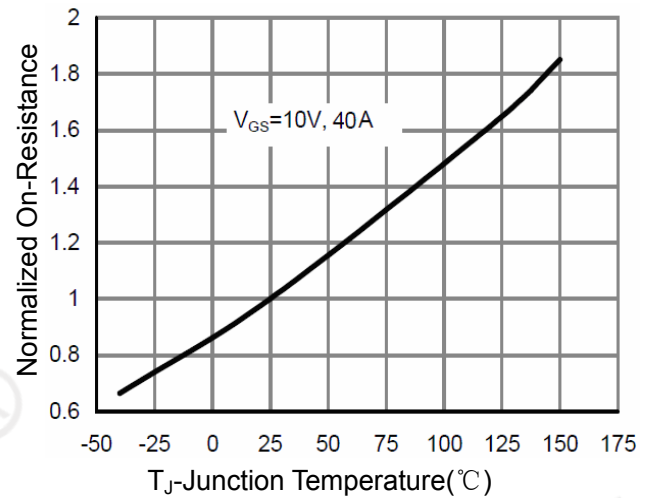


Figure 4 Rdson-Junction Temperature

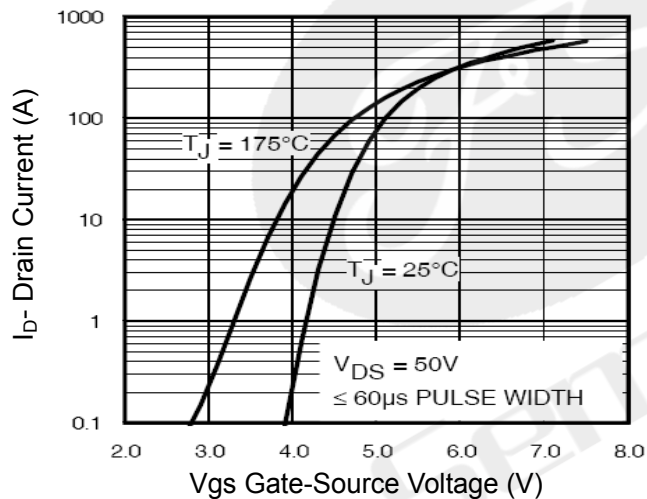


Figure 2 Transfer Characteristics

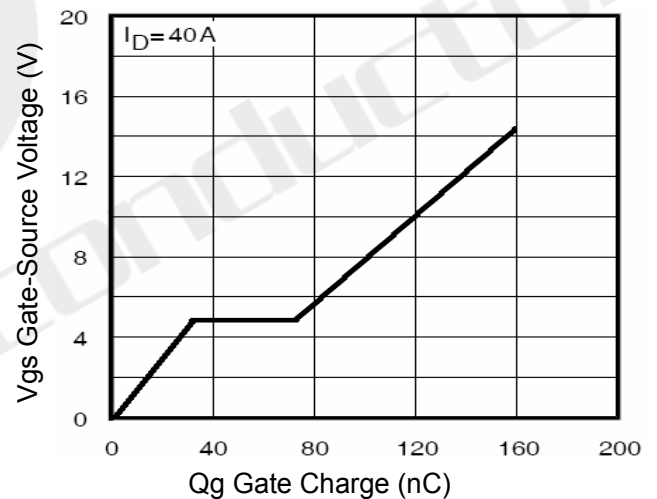


Figure 5 Gate Charge

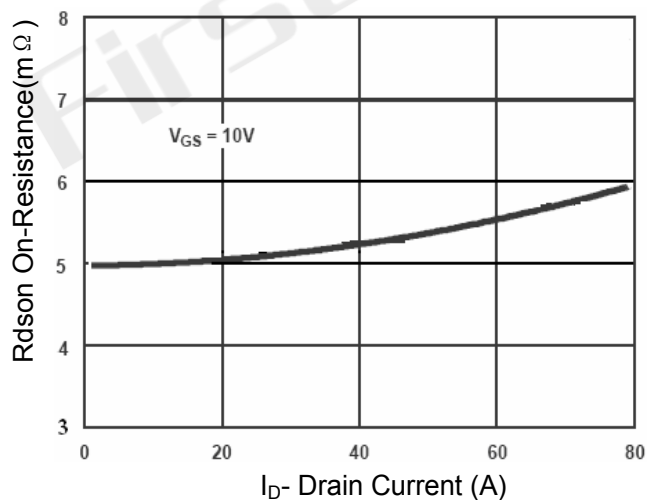


Figure 3 Rdson- Drain Current

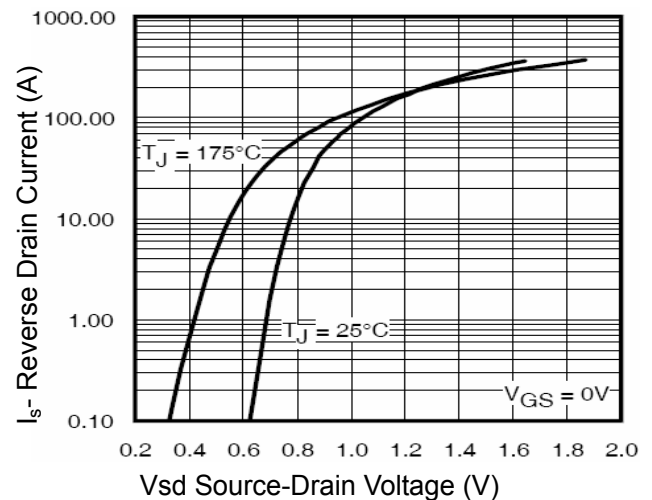


Figure 6 Source- Drain Diode Forward

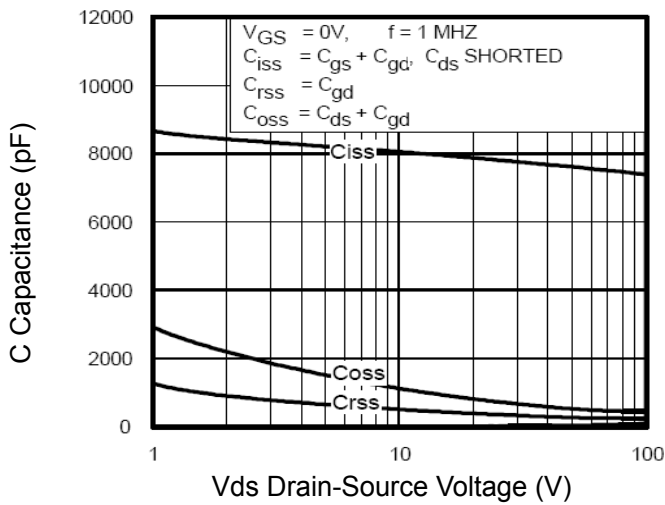


Figure 7 Capacitance vs Vds

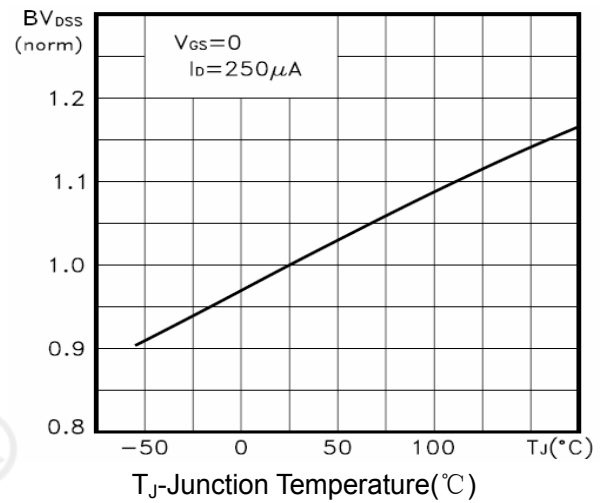
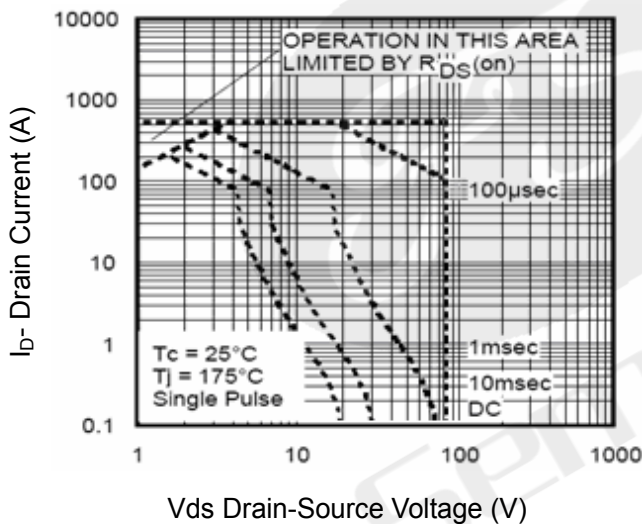
Figure 9 BV_{DSS} vs Junction Temperature

Figure 8 Safe Operation Area

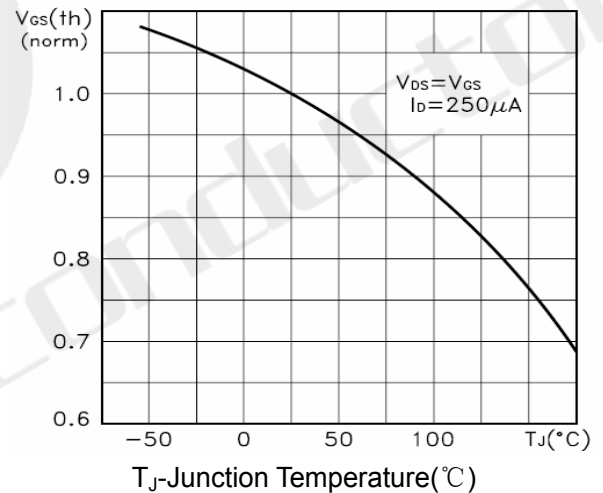
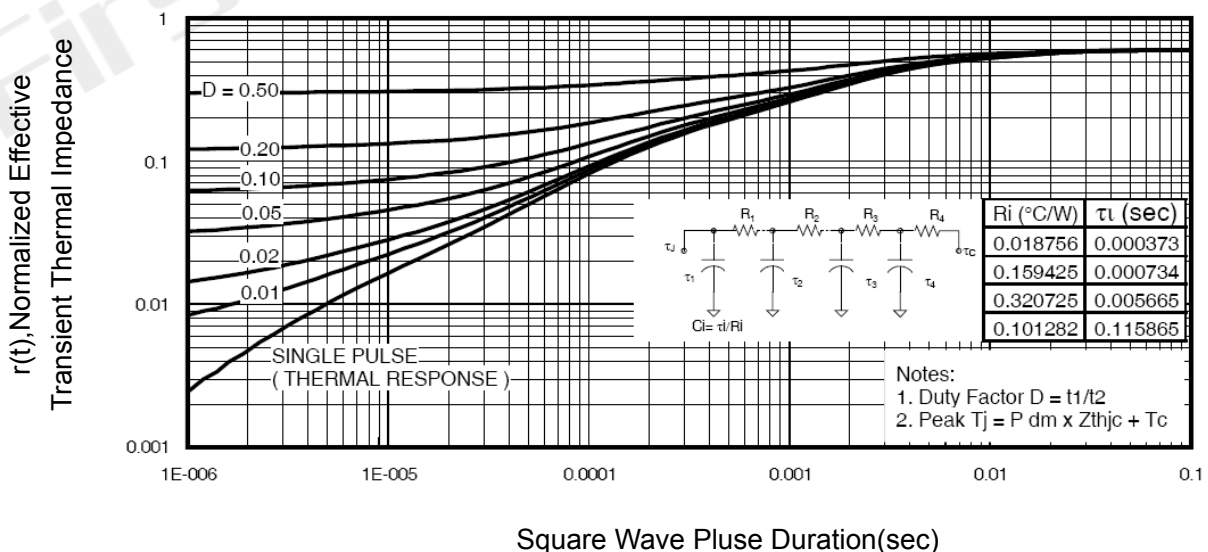
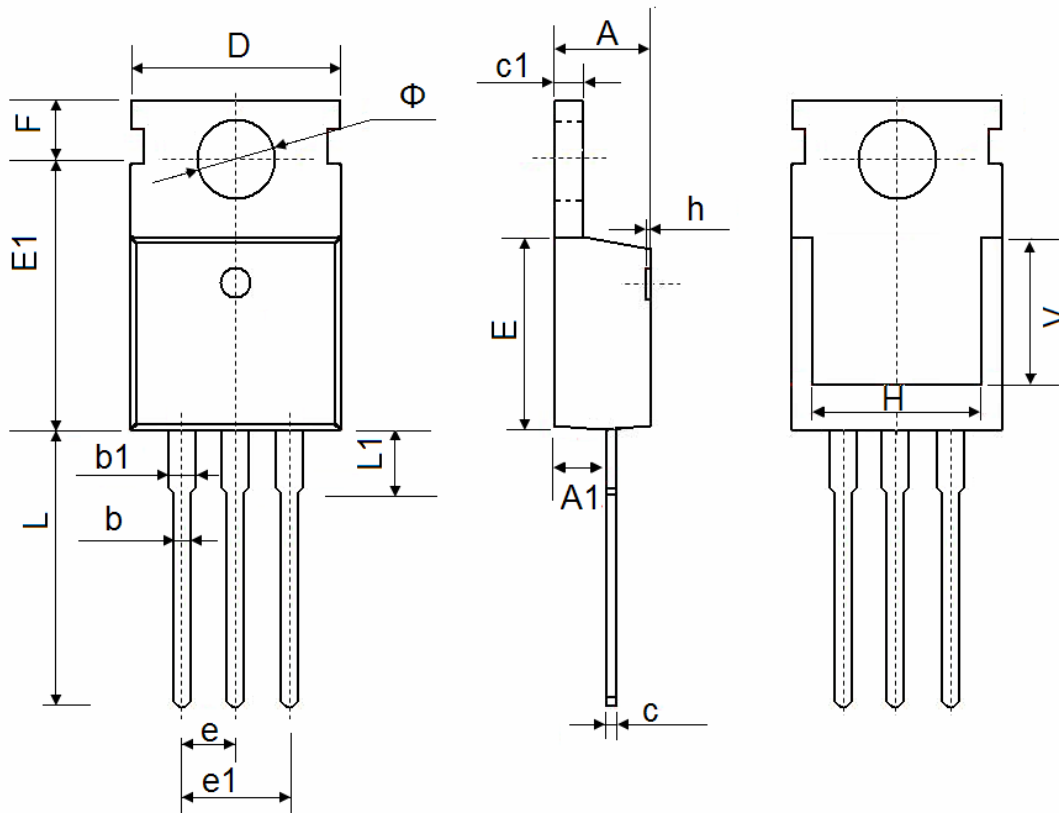
Figure 10 $V_{GS(th)}$ vs Junction Temperature

Figure 11 Normalized Maximum Transient Thermal Impedance



TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150



Declaration

- FIRST reserves the right to change the specifications, the same specifications of products due to different packaging line mold, the size of the appearance will be slightly different, shipped in kind, without notice! Customers should obtain the latest version information before ordering, and verify whether the relevant information is complete and up-to-date.
- Any semiconductor product under certain conditions has the possibility of failure or failure, The buyer has the responsibility to comply with safety standards and take safety measures when using FIRST products for system design and manufacturing, To avoid To avoid potential failure risks, which may cause personal injury or property damage!
- Product promotion endless, our company will wholeheartedly provide customers with better products!

ATTACHMENT

Revision History

Date	REV	Description	Page
2018.01.01	1.0	Initial release	