



PE40P50M P-Channel Enhancement Mode Power MOSFET

PE40P50M Description

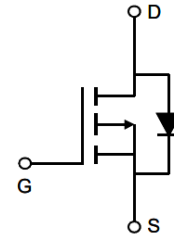
The PE40P50M uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE40P50M General Features

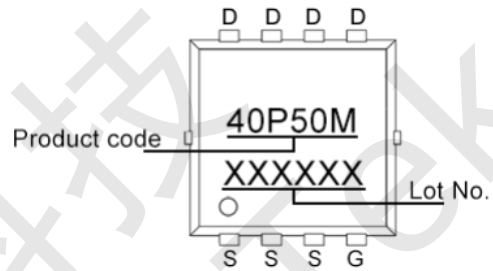
- $V_{DS} = -40V$, $I_D = -40A$
- $R_{DS(ON)} < 13m\Omega$ @ $V_{GS} = -10V$
- $R_{DS(ON)} < 18m\Omega$ @ $V_{GS} = -4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

PE40P50M Application

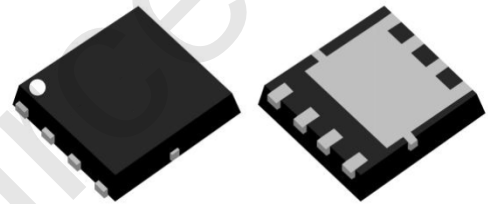
- DC-DC converter
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



PDFN3.3x3.3-8L

PE40P50M Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-40	A
Drain Current-Continuous (TC=100°C)	I_D	-30	A
Pulsed Drain Current (Note 1)	I_{DM}	-120	A
Maximum Power Dissipation	P_D	69	W
Single Pulsed Avalanche Energy (L=0.1mH)	E_{AS}	80	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

PE40P50M Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.8	°C/W
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	64.3	°C/W



PE40P50M Electrical Characteristics (TC=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-18A$	-	10.5	13	m Ω
		$V_{GS}=-4.5V, I_D=-12A$	-	13.5	18	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-18A$	-	50	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=-20V, V_{GS}=0V,$ $F=1.0MHz$	-	3500	-	pF
Output Capacitance	C_{oss}		-	310	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	255	-	pF
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, F=1.0MHz$	-	9.2	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=-15V, I_D=-18A,$ $V_{GS}=-10V, R_G=3\Omega$	-	38	-	nS
Turn-on Rise Time	t_r		-	31	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	90	-	nS
Turn-Off Fall Time	t_f		-	9.2	-	nS
Total Gate Charge	Q_g	$V_{DS}=-20V, I_D=-18A,$ $V_{GS}=-10V$	-	28	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	8.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-40	A

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 product.



PE40P50M Typical Electrical and Thermal Characteristics

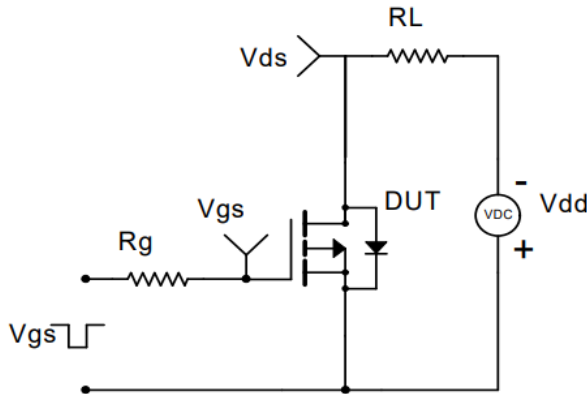


Figure 1 Switching Test Circuit

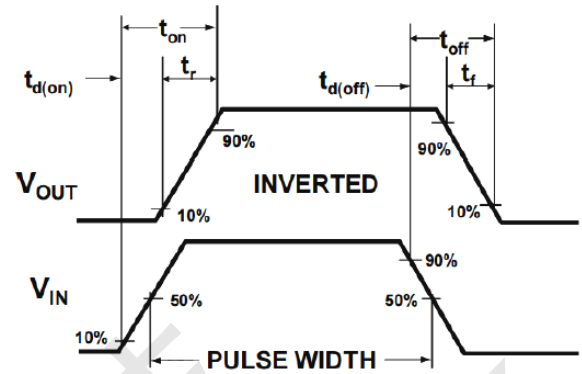


Figure 2 Switching Waveform

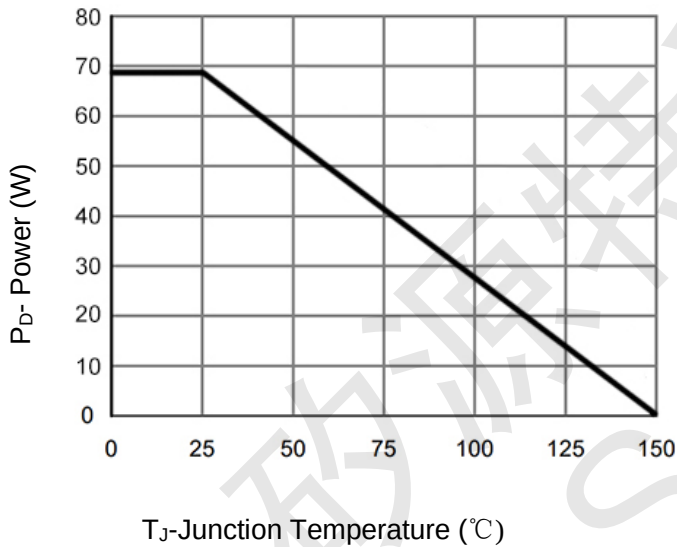


Figure 3 Power De-rating

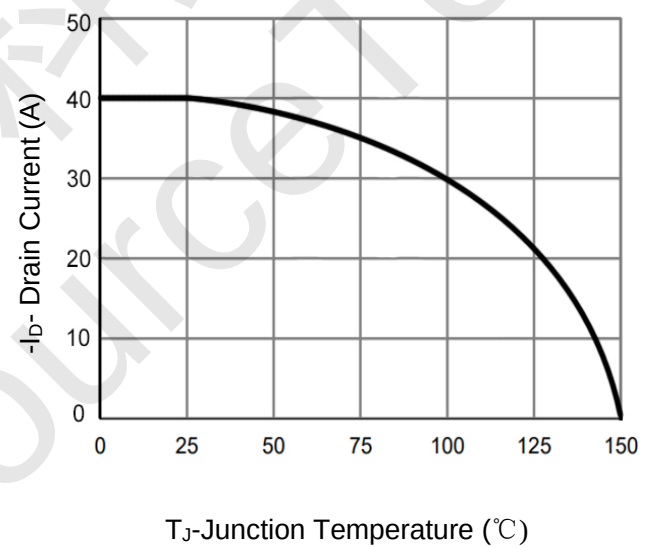


Figure 4 Drain Current

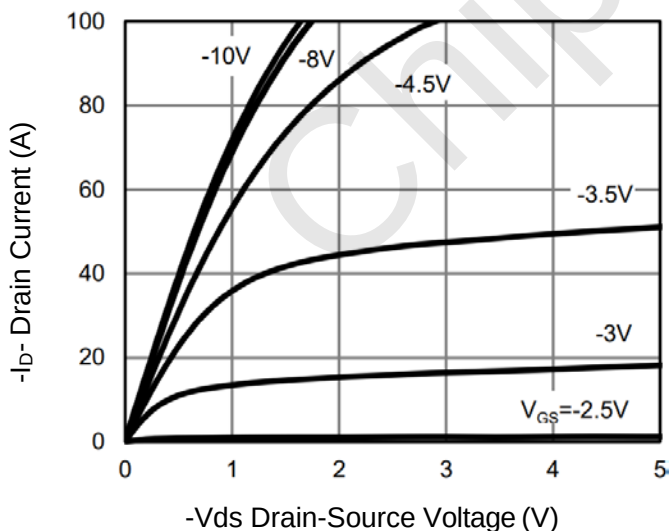


Figure 5 Output Characteristics

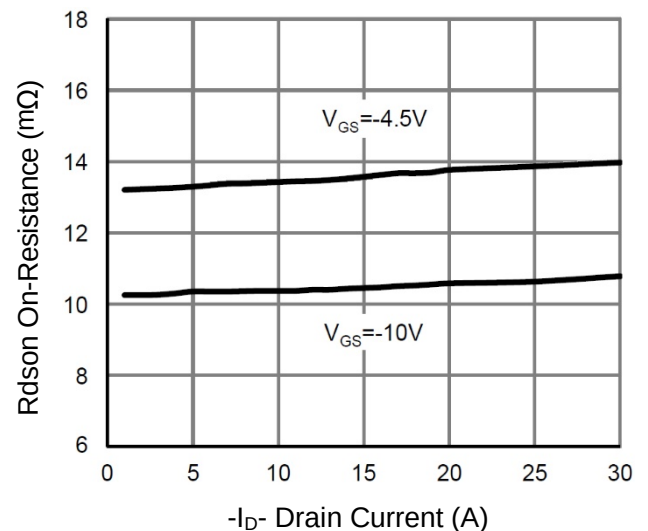


Figure 6 Rdson vs Drain Current

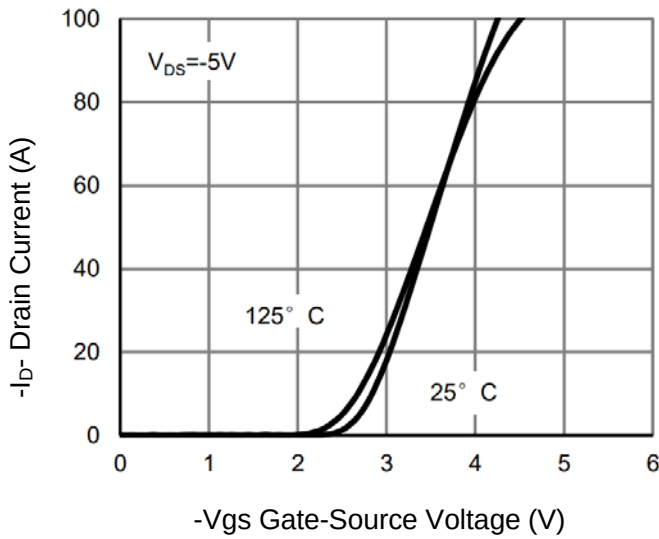


Figure 7 Transfer Characteristics

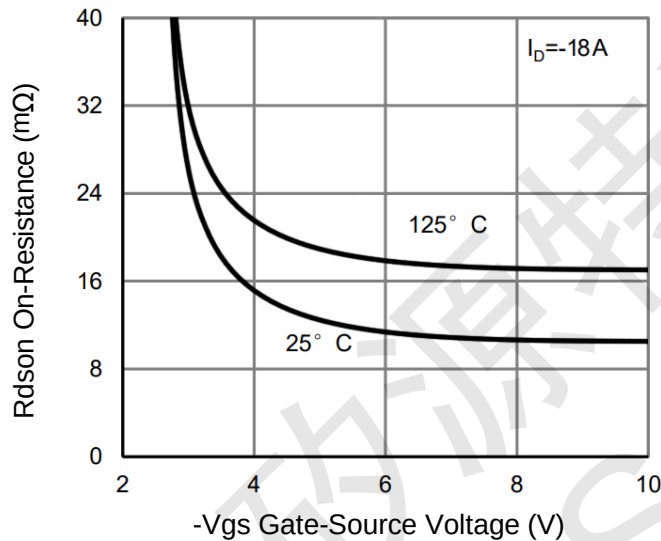


Figure 9 Rdson vs VGS

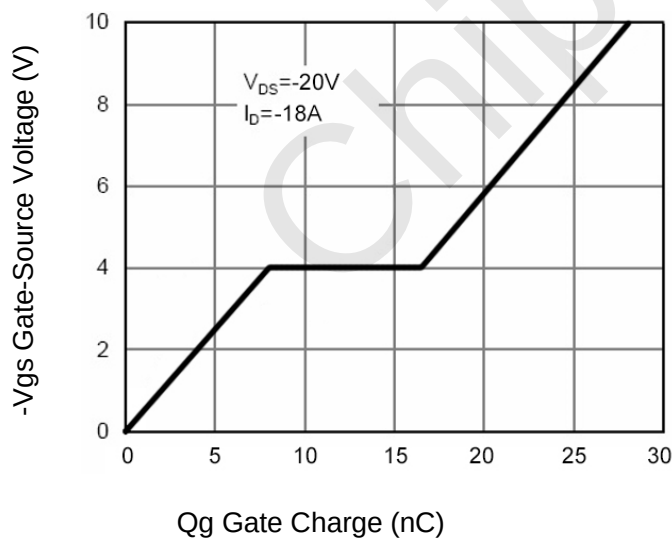


Figure 11 Gate Charge

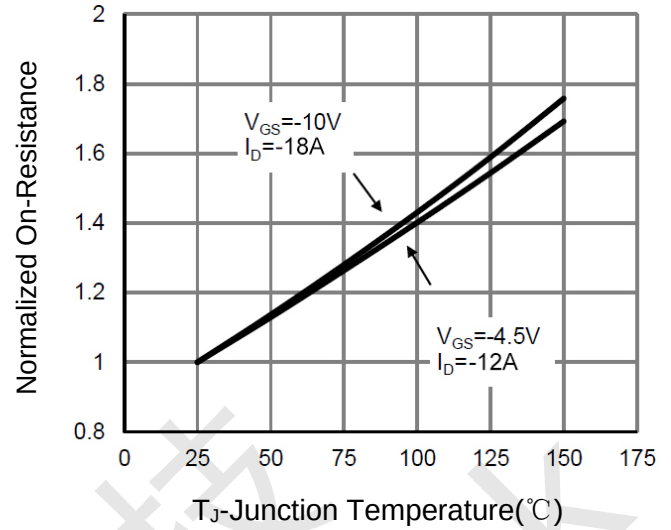


Figure 8 Rdson vs Junction Temperature

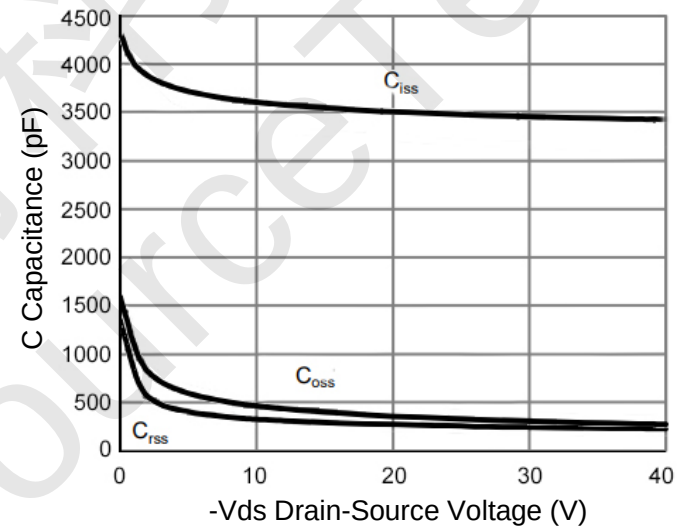


Figure 10 Capacitance vs Vds

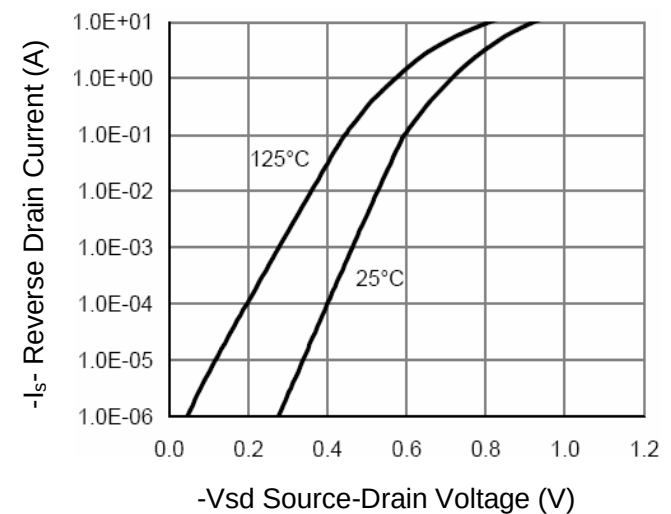


Figure 12 Source- Drain Diode Forward

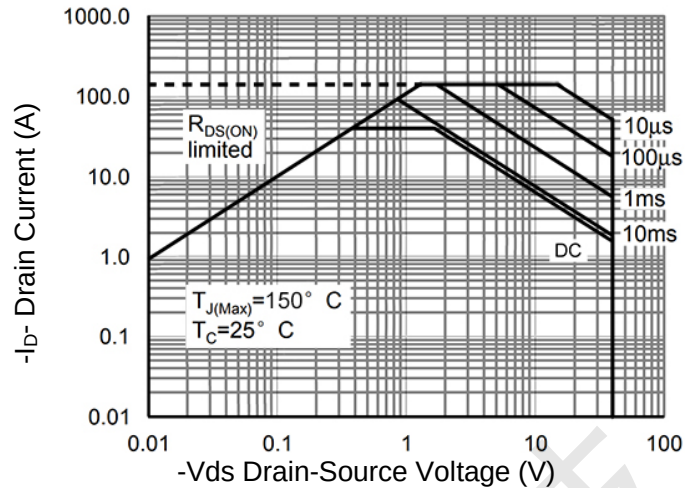


Figure 13 Safe Operation Area

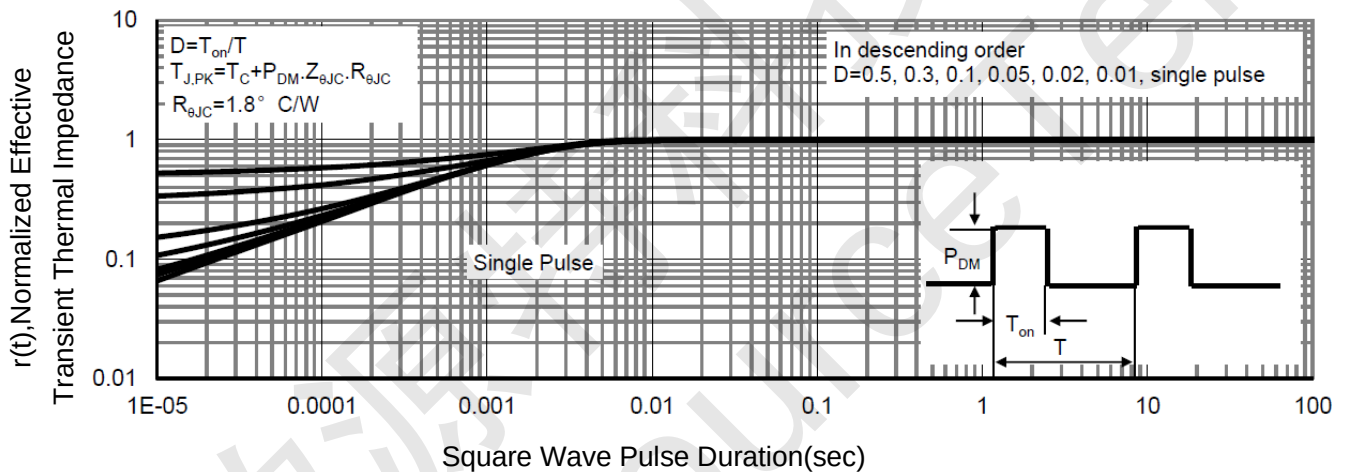
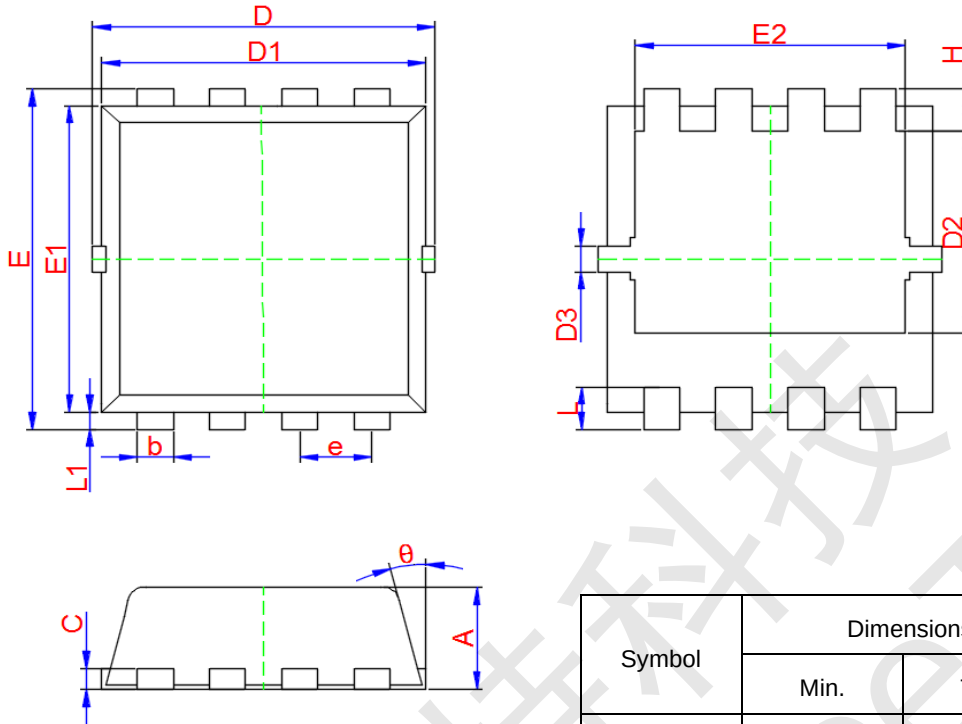


Figure 14 Normalized Maximum Transient Thermal Impedance



PE40P50M PDFN3.3x3.3-8L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.650	0.770	0.900
b	0.250	0.300	0.350
c	0.100	0.150	0.250
D	3.150	3.300	3.400
D1	2.950	3.100	3.200
D2	1.600	1.800	1.930
D3	-	0.130	-
E	3.050	3.300	3.450
E1	2.950	3.150	3.200
E2	2.300	2.400	2.550
e	0.650 TYP.		
H	0.330	0.430	0.530
L	0.300	0.400	0.500
L1	0.080	0.130	0.180
θ	-	10°	-