

N-channel Enhancement Mode Power MOSFET

Features

- Very Low On-resistance $R_{DS(ON)}$
- Low C_{rss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

Product Summary

Parameters	Value	Unit
V_{DSS}	40	V
$V_{GS(th_Typ)}$	2.0	V
$I_D(@V_{GS}=10V)$	160	A
$R_{DS(ON_Typ)}(@V_{GS}=10V)$	1.15	m Ω
$R_{DS(ON_Typ)}(@V_{GS}=4.5V)$	1.4	m Ω

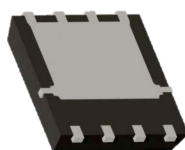
Applications

- PWM Application
- Load Switch
- Power Management

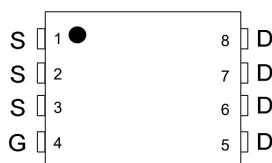
Top View



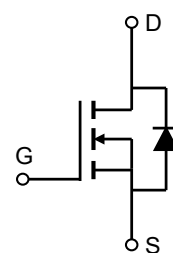
Bottom View



PDFN5x6-8L



Marking



Schematic Diagram

Ordering Information

Device	Marking	Package	Packing	Reel Size	Tape Width	Reel (pcs)
ZK40G160G	40G160	DFN5x6	Reel	N/A	N/A	5000

MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	160	A
	$T_C = 100^{\circ}\text{C}$		100	
Pulsed Drain Current		I_{DM}	360	A
Single Pulsed Avalanche Energy		E_{AS}	91	mJ
Power Dissipation		P_D	114	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.1	$^{\circ}\text{C/W}$
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	$^{\circ}\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	40			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1.0	μA
Gate-body leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$			± 100	nA
On characteristics ④						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.5	2.2	V
Static drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		3.6	4.8	m Ω
		$V_{GS} = 4.5V, I_D = 15A$		4.8	6.6	m Ω
Dynamic characteristics ④ ⑤						
Input capacitance	C_{iss}	$V_{DS} = 20V, V_{GS} = 0V$ $f = 1MHz$		3200		pF
Output capacitance	C_{oss}			269		
Reverse transfer capacitance	C_{rss}			242		
Gate Resistance	R_G	$f = 1MHz$		3.2		Ω
Switching characteristics ④ ⑤						
Total gate charge	Q_g	$V_{GS} = 0 \text{ to } 10V$ $V_{DS} = 20V, I_D = 45A$		68		nC
Gate-source charge	Q_{gs}			10		
Gate-drain charge	Q_{gd}			18		
Turn-on delay time	$t_{d(on)}$	$V_{DS} = 15V, I_D = 45A$ $V_{GS} = 10V, R_{GEN} = 4.7\Omega$		12		ns
Turn-on rise time	t_r			66		
Turn-off delay time	$t_{d(off)}$			48		
Turn-off fall time	t_f			45		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V_{SD} ④	$V_{GS} = 0V, I_S = 1A$			1.2	V
Continuous drain-source diode forward current	I_S ①	$T_C = 25^\circ C$			90	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				360	

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_G = 10V$, $R_G = 25\Omega$, $L = 0.5mH$.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

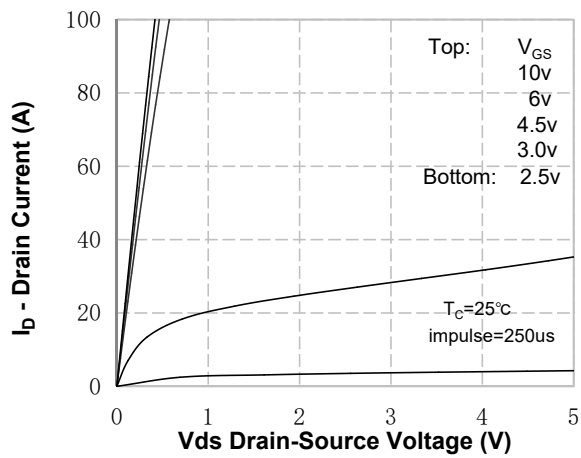


Figure 1. On-Region Characteristics

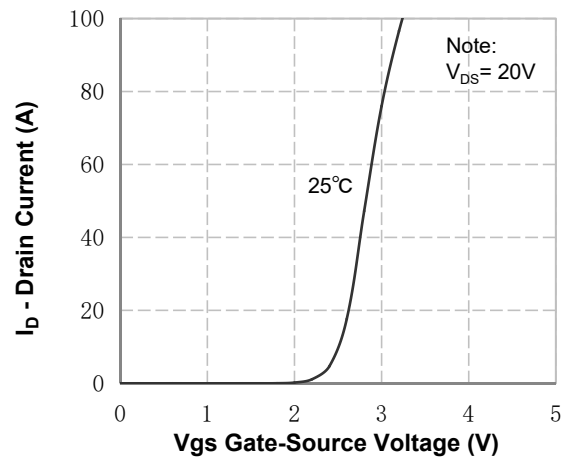


Figure 2. Transfer Characteristics

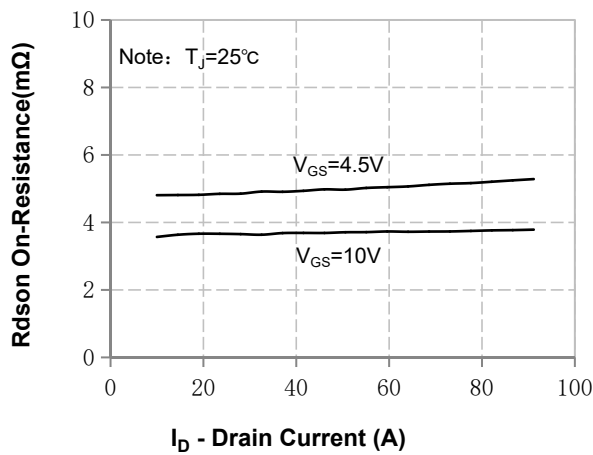


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

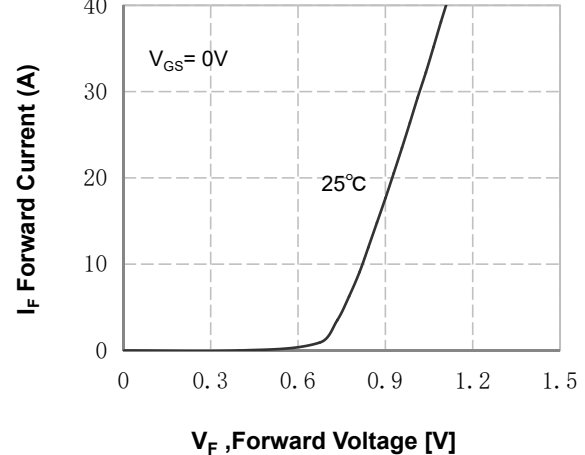


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

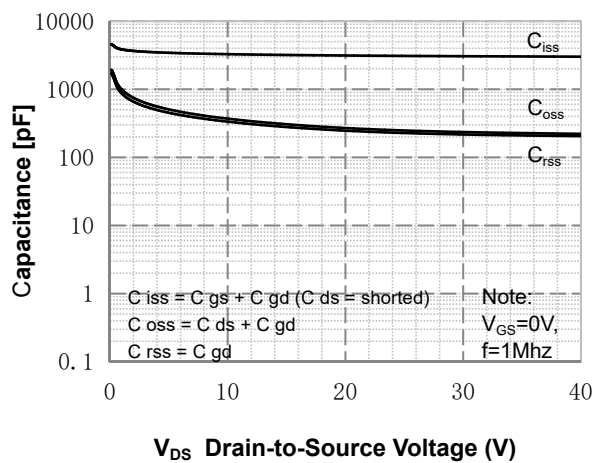


Figure 5. Capacitance Characteristics

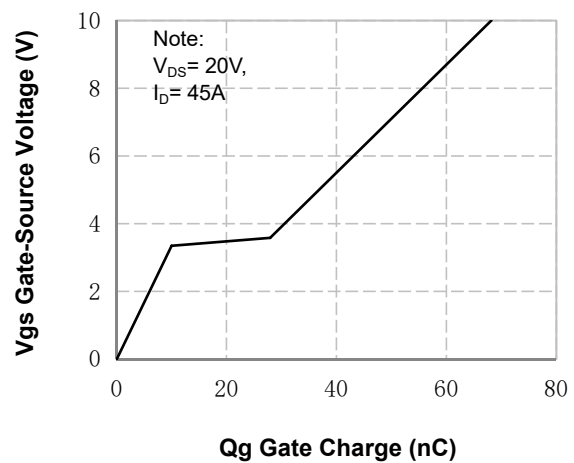


Figure 6. Gate Charge Characteristics

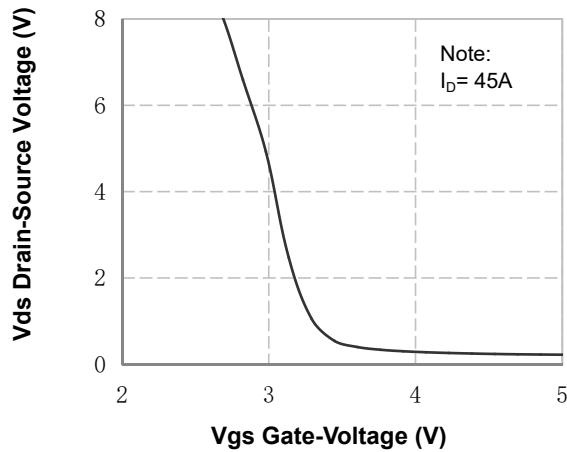


Figure 7. V_{DS} Drain-Source Voltage vs Gate Voltage

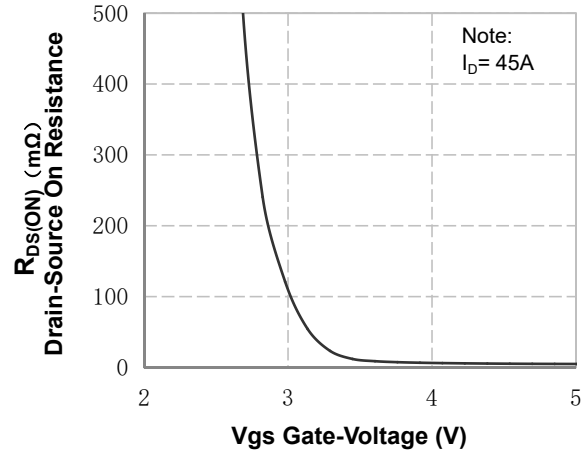


Figure 8. On-Resistance vs Gate Voltage

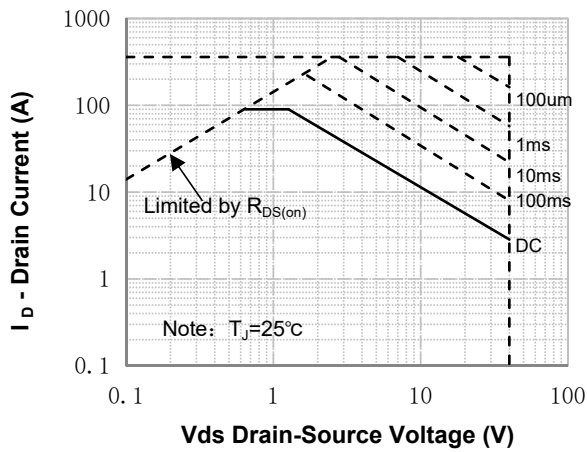


Figure 9. Maximum Safe Operating Area

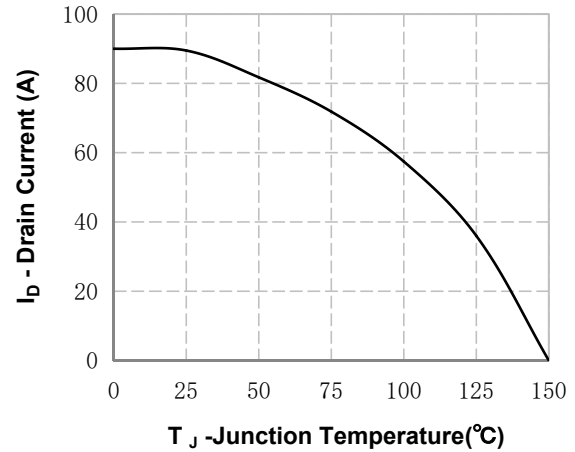


Figure 10. Maximum Continuous Drain Current vs Temperature

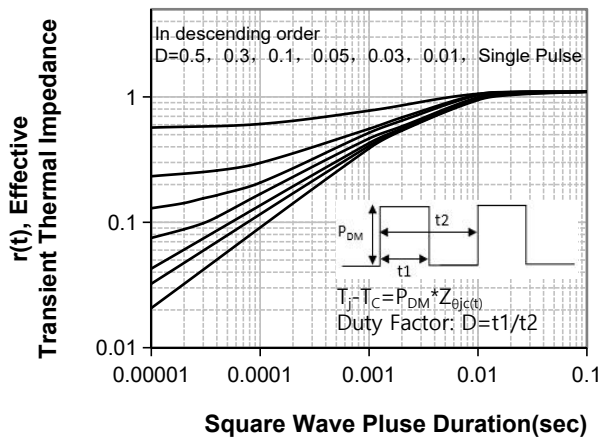
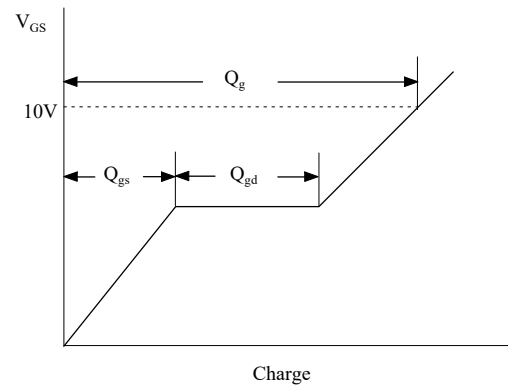
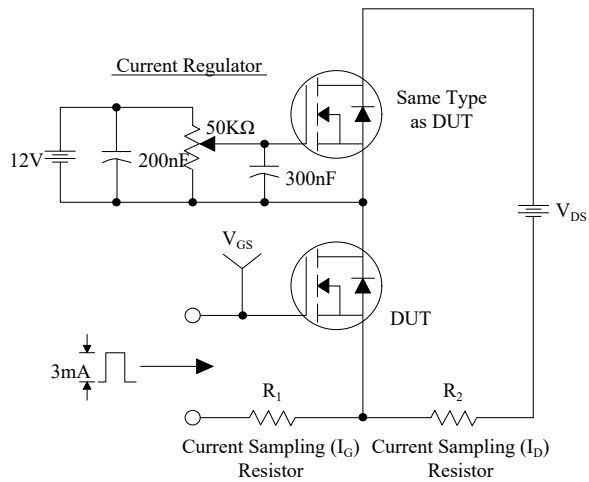
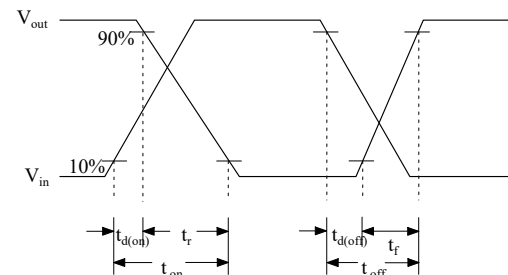
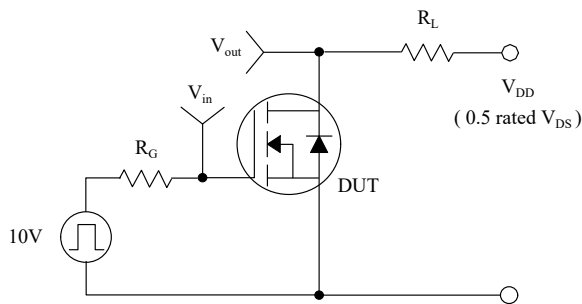


Figure 11. Transient Thermal Response Curve

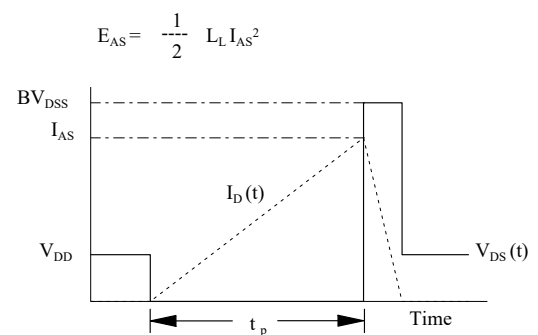
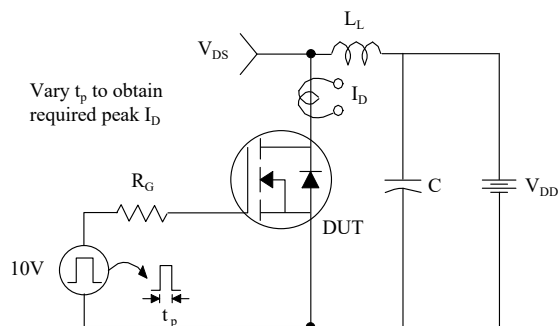
Gate Charge Test Circuit & Waveform



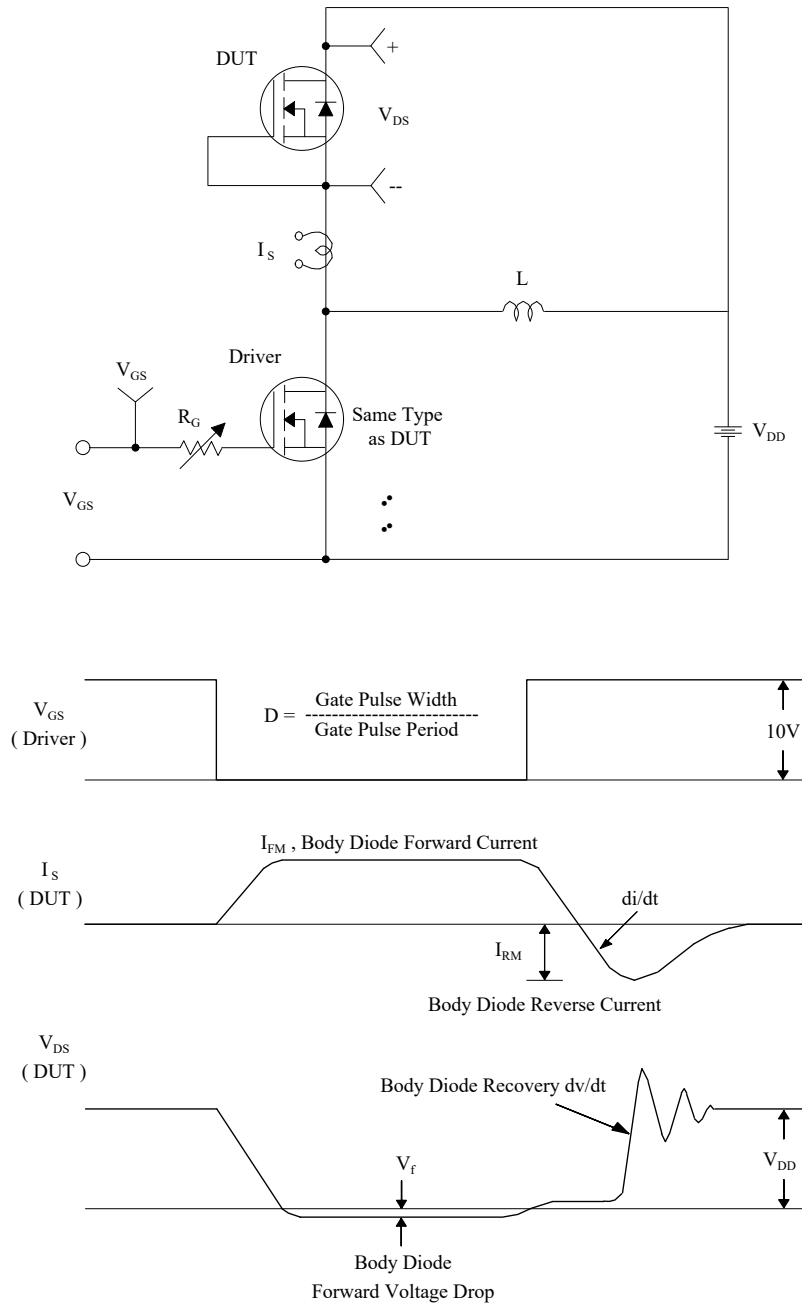
Resistive Switching Test Circuit & Waveforms

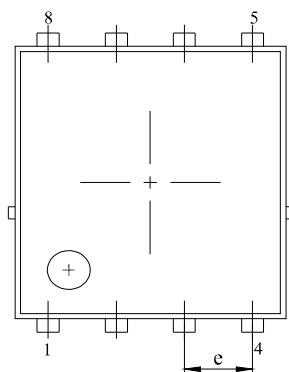


Unclamped Inductive Switching Test Circuit & Waveforms

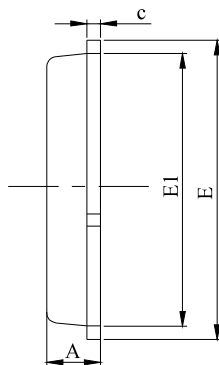


Peak Diode Recovery dv/dt Test Circuit & Waveforms

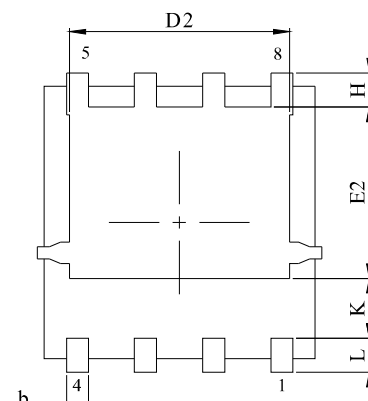




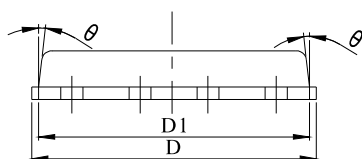
Top View



Side View



Bottom View



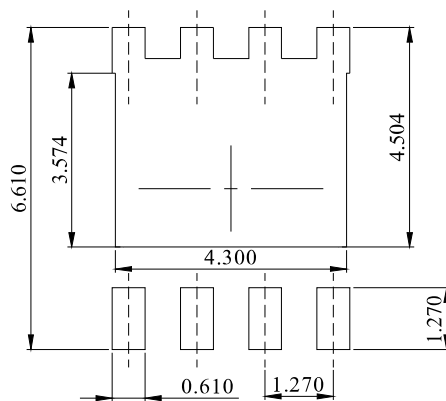
Front View

NOTES:

1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter (angle in degree).
3. Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.31	0.41	0.51
c	0.20	0.25	0.30
D	5.00	5.20	5.40
D1	4.95	5.05	5.15
D2	4.00	4.10	4.20
E	6.05	6.15	6.25
E1	5.50	5.60	5.70
E2	3.42	3.53	3.63
e	1.27BSC		
H	0.60	0.70	0.80
L	0.50	0.70	0.80
K	1.23 REF		
theta	-	-	10°

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS