

FEATURES

- $BV_{DSS}=60V$, $I_D=50A$
- $R_{DS(on)}: 17m\Omega(Max)@V_{GS}=10V$
- $R_{DS(on)}: 20m\Omega(Max)@V_{GS}=4.5V$
- 100% avalanche tested
- RoHS compliant



APPLICATIONS

- Load Switch
- Power Management
- Motor Drive Application



Device Marking and Package Information

Ordering code	Package	Marking
MPTP50N60N	TO-220	MPTP50N60N

Absolute Maximum Ratings $T_C = 25^\circ C$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	60	V
Continuous Drain Current	I_D	50	A
Pulsed Drain Current (note1)	I_{DM}	200	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	64	mJ
Power Dissipation ($T_C = 25^\circ C$)	P_D	75	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+175	$^\circ C$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	2.0	K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	



Specifications $T_J = 25^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V, T_J = 25^{\circ}\text{C}$	--	--	1.0	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 0.25mA$	1.0	1.6	2.5	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 30A$	--	11.5	17	m Ω
		$V_{GS} = 4.5V, I_D = 20A$	--	13.0	20	m Ω
Gate Resistance	R_G	$f = 1.0MHz, \text{open drain}$	--	2.0	--	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz$	--	2900	--	pF
Output Capacitance	C_{oss}		--	140	--	
Reverse Transfer Capacitance	C_{rss}		--	120	--	
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 30A, V_{GS} = 10V$	--	50	--	nC
Gate-Source Charge	Q_{gs}		--	8	--	
Gate-Drain Charge	Q_{gd}		--	9	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 30V, R_L = 6\Omega, V_{GS} = 10V, R_G = 1.8\Omega$	--	10	--	ns
Turn-on Rise Time	t_r		--	6	--	
Turn-off Delay Time	$t_{d(off)}$		--	25	--	
Turn-off Fall Time	t_f		--	7	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^{\circ}\text{C}$	--	--	50	A
Pulsed Diode Forward Current	I_{SM}		--	--	200	
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}\text{C}, I_{SD} = 30A, V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Time	t_{rr}	$V_R = 30V, I_F = 30A, di_F/dt = 100A/\mu s$	--	30	--	ns
Reverse Recovery Charge	Q_{rr}		--	40	--	nC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 0.5mH, V_{DD} = 30V, R_G = 25\Omega, \text{Starting } T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s, \text{Duty Cycle } \leq 0.5\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

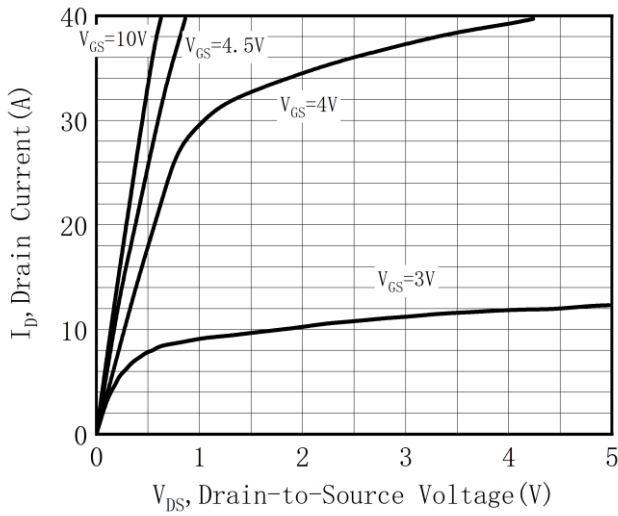


Figure 2. Transfer Characteristics

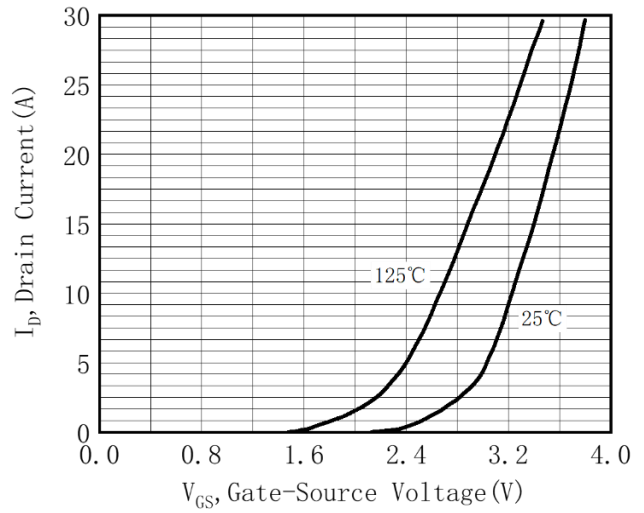


Figure 3. On-Resistance vs Drain Current

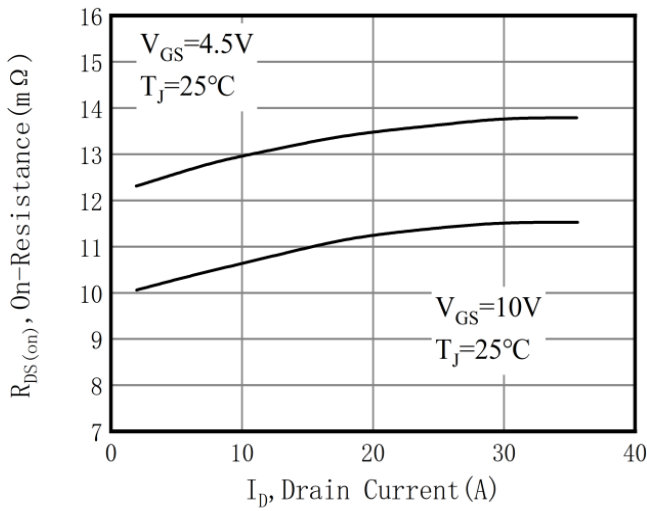


Figure 4. Capacitance

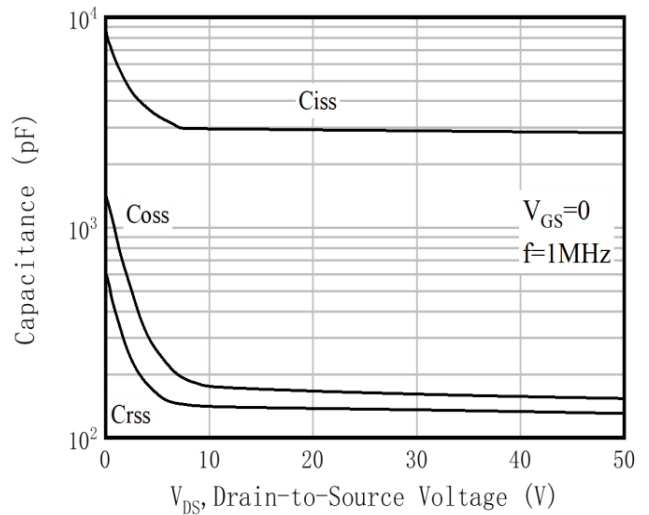


Figure 5. Gate Charge

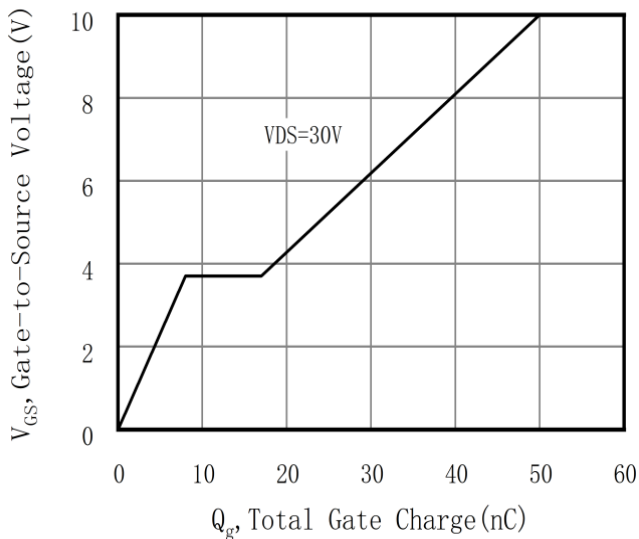
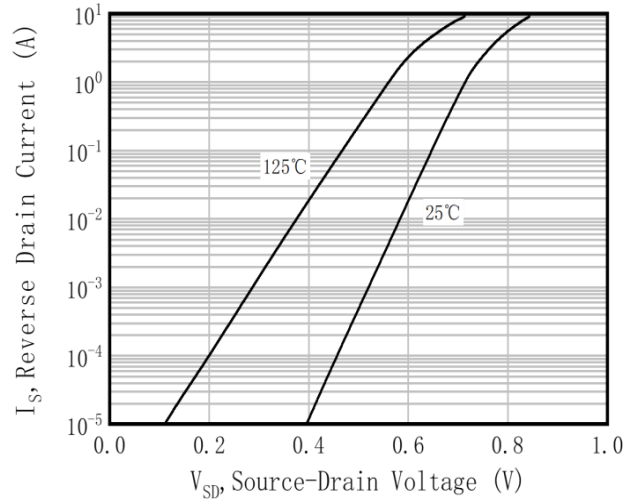


Figure 6. Body Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. On-Resistance vs Junction Temperature

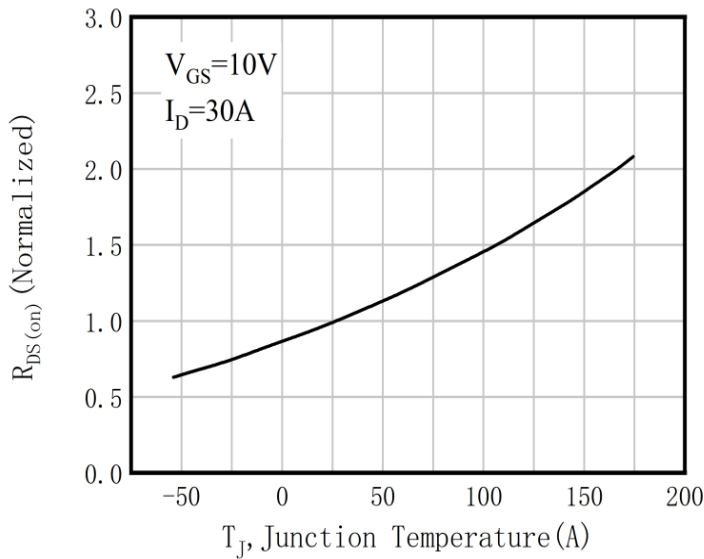


Figure 8. Threshold Voltage vs Junction Temperature

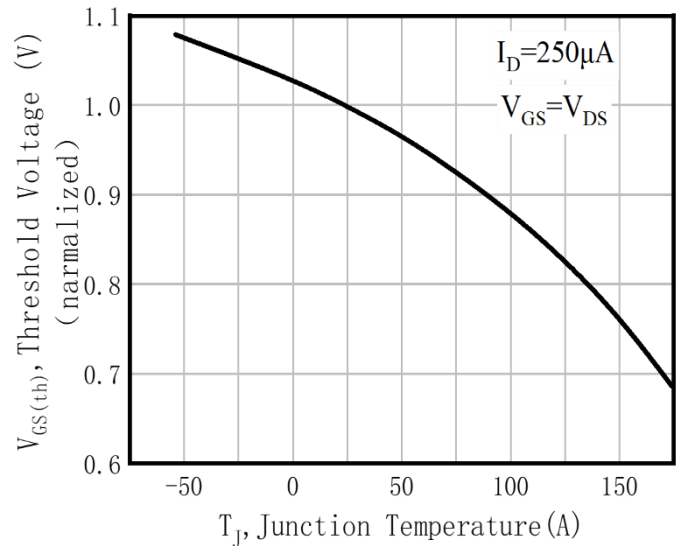


Figure 9. Transient thermal Impedance

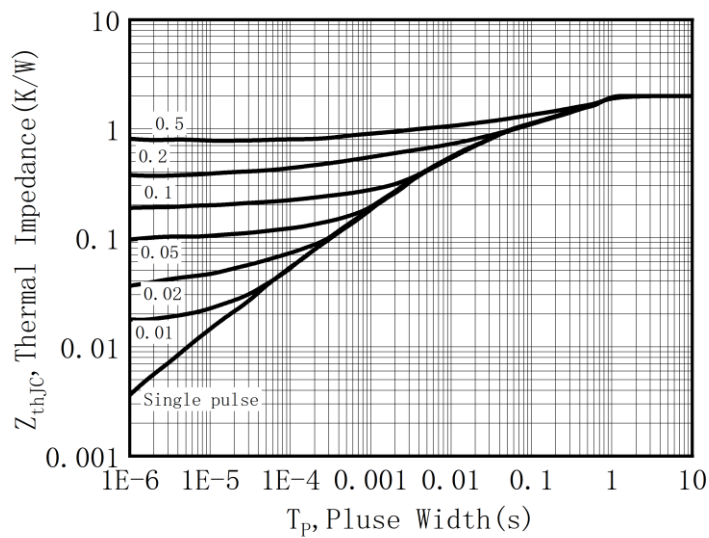


Figure 10. Safe Operating Area

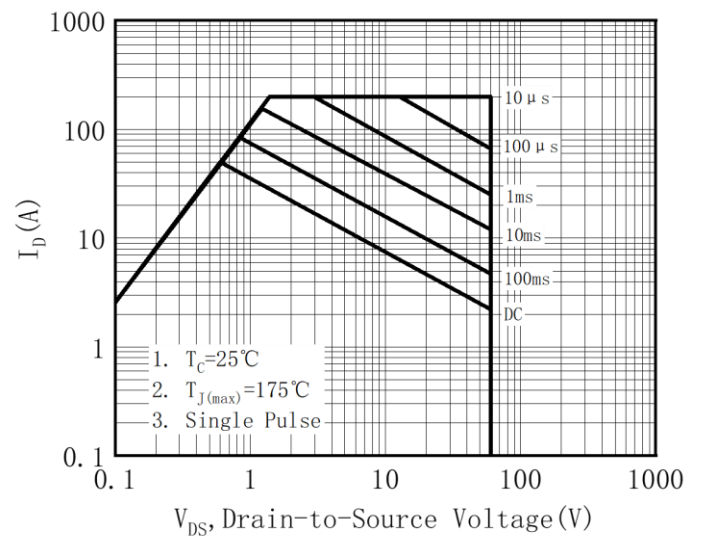


Figure A: Gate Charge Test Circuit and Waveform

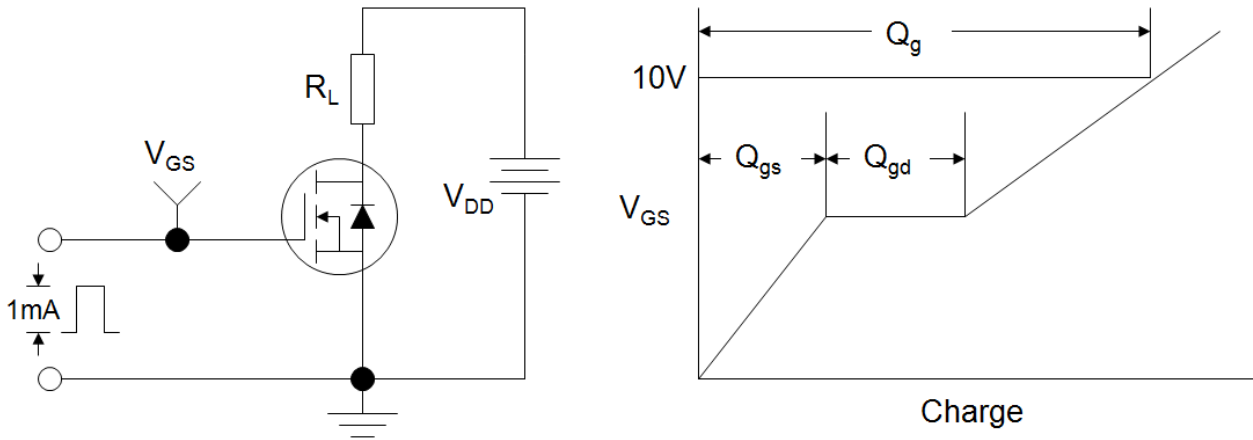


Figure B: Resistive Switching Test Circuit and Waveform

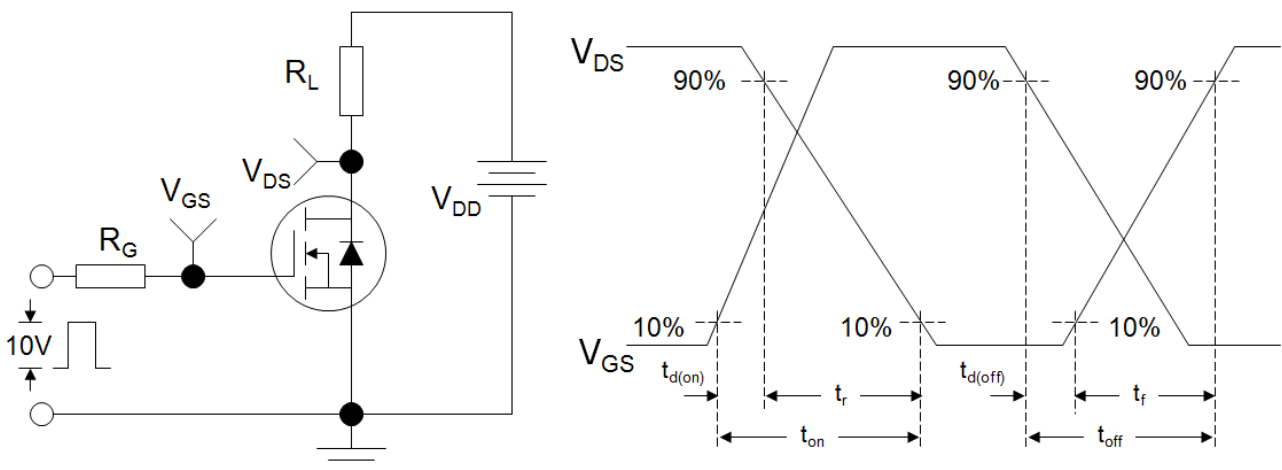
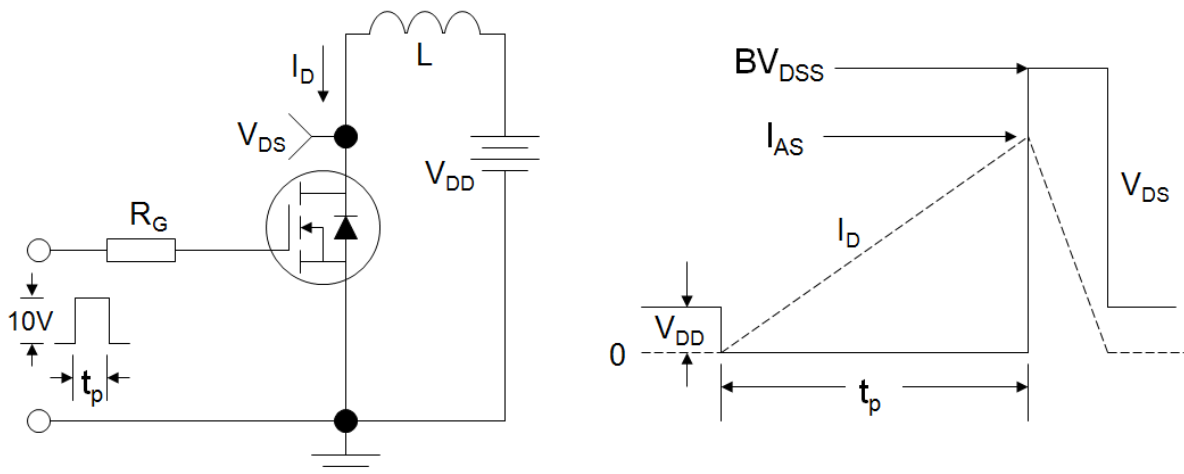
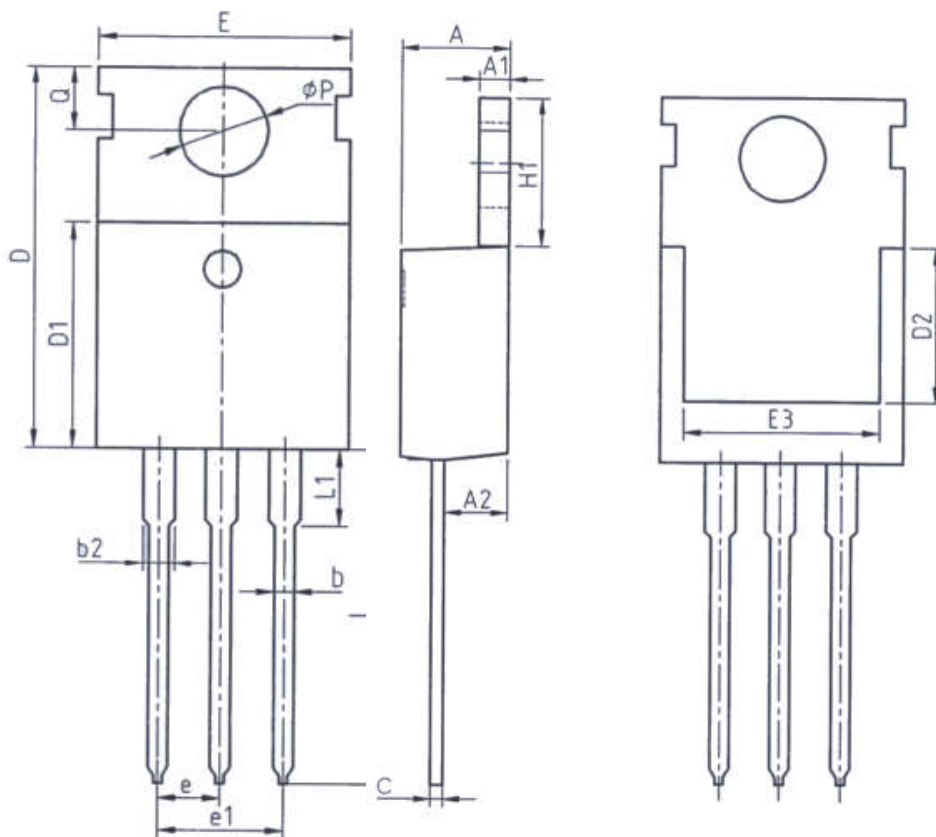


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



TO-220



Unit: mm		
Symbol	Min.	Max.
A	4.37	4.77
A1	1.25	1.45
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.40	0.65
D	15.10	16.10
D1	8.80	9.40
D2	5.50	-

Unit: mm		
Symbol	Min.	Max.
E	9.70	10.30
E3	7.00	-
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	-	3.40
P	3.40	3.80
Q	2.60	3.00