

## Features

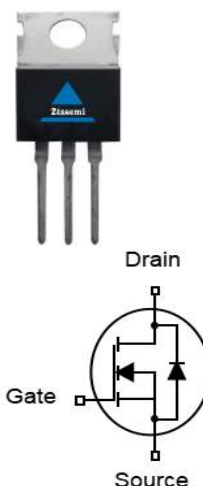
- N-Channel
- Excellent gate charge x  $R_{DS(on)}$  product
- Very low on-resistance  $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% EAS tested

$V_{DS}$	60	V
$R_{DS(on),TYP}@ V_{GS}=10V$	2.7	m $\Omega$
$I_D$	160	A



Part ID	Package Type	Marking	Packing
ZTG020N06	TO-220	ZTG020N06	1000pcs/Tape

TO-220



## Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (<math>T_c=25^\circ\text{C}</math> Unless Otherwise Noted)</b>				
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	60	V	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed	$T_c = 25^\circ\text{C}$ 640	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous	$T_c = 25^\circ\text{C}$	160	A
		$T_c = 100^\circ\text{C}$	102	A
$P_D$	Maximum Power Dissipation	125	W	
dv/dt	Drain Source voltage slope, $V_{DS} \leq 48V$	50	V/ns	
dv/dt	Reverse diode dv/dt, $V_{DS} \leq 48V, I_{SD} < I_D$	15	V/ns	
$R_{\theta JC}$	Thermal Resistance-Junction to Case (Note 2)	1.0	$^\circ\text{C/W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 5)	232	mJ	

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub>=25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.3	3.0	3.7	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance <sup>(Note 3)</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =50A	--	2.7	3.2	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated) <sup>(Note 4)</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	--	4100	--	pF
C <sub>oss</sub>	Output Capacitance		--	1010	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	36	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	3.4	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =30V, I <sub>D</sub> =80A, V <sub>GS</sub> =10V	--	62	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	25	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	14	--	nC
<b>Switching Characteristics <sup>(Note 4)</sup></b>						
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =30V, I <sub>D</sub> =80A, R <sub>G</sub> =3.0Ω, V <sub>GS</sub> =10V	--	22	--	ns
T <sub>r</sub>	Turn-on Rise Time		--	31	--	ns
T <sub>d(off)</sub>	Turn-Off Delay Time		--	47	--	ns
T <sub>f</sub>	Turn-Off Fall Time		--	19	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
I <sub>S</sub>	Diode Forward Current <sup>(Note 2)</sup>		--	--	160	A
V <sub>SD</sub>	Forward on voltage <sup>(Note 3)</sup>	I <sub>S</sub> =80A, V <sub>GS</sub> =0V	--	--	1.4	V
T <sub>rr</sub>	Reverse Recovery Time	V <sub>DD</sub> =30V, I <sub>F</sub> =80A di/dt=100A/μs	--	50	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	66	--	nC

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.1mH, R<sub>G</sub>=25Ω

Typical Electrical and Thermal Characteristics

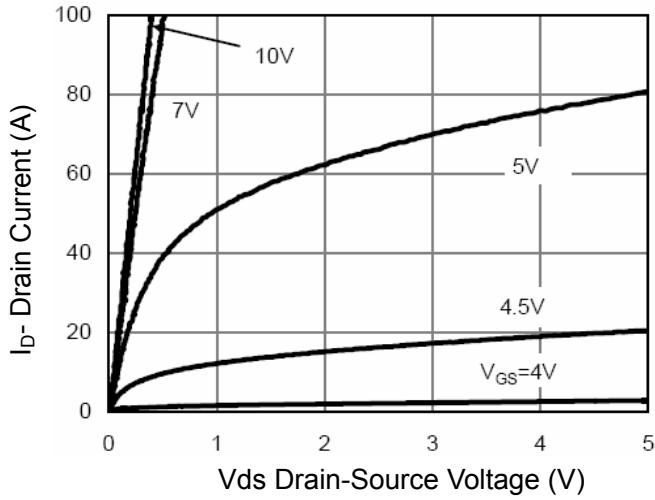


Figure 1 Output Characteristics

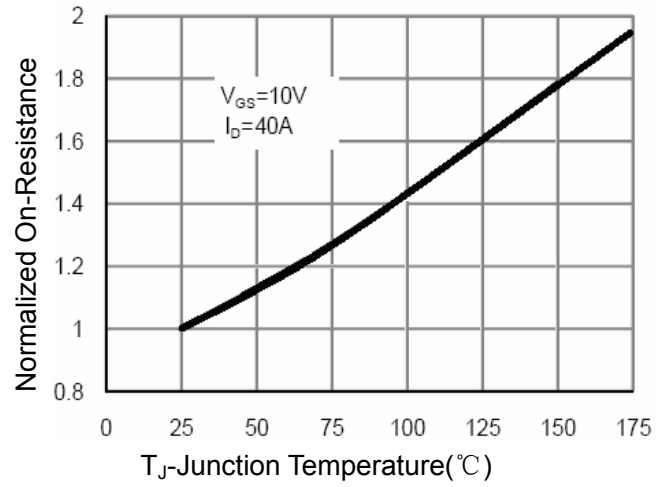


Figure 4 Rdson-Junction Temperature

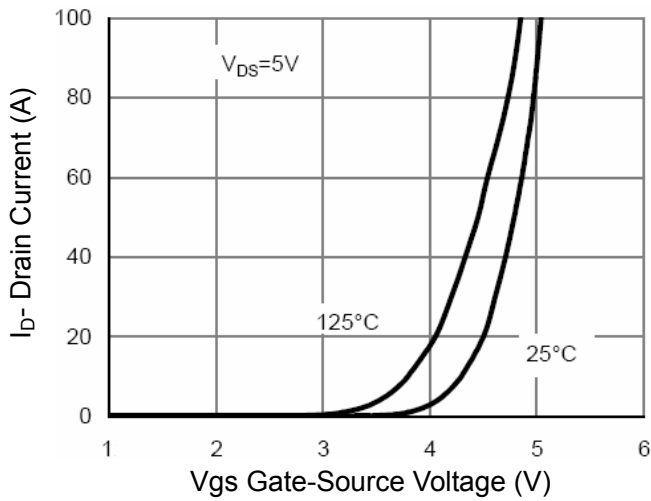


Figure 2 Transfer Characteristics

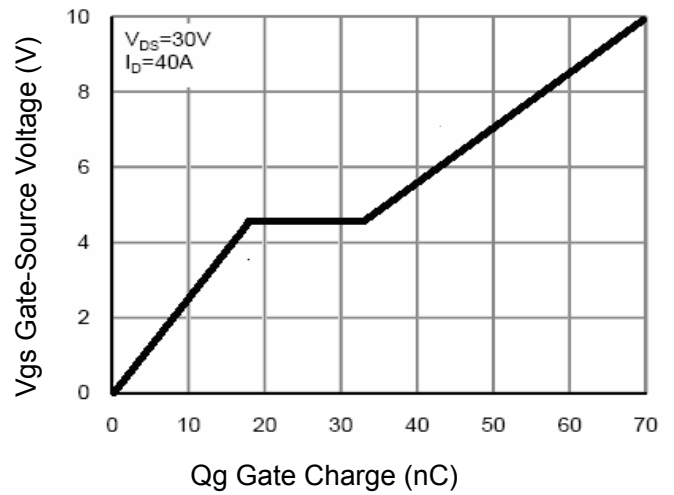


Figure 5 Gate Charge

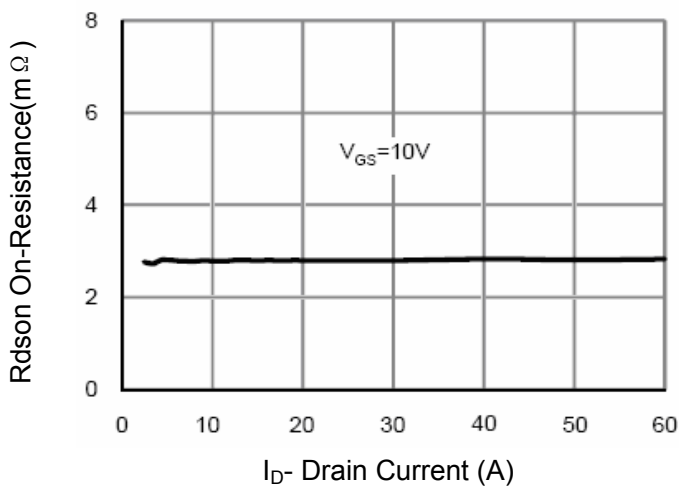


Figure 3 Rdson- Drain Current

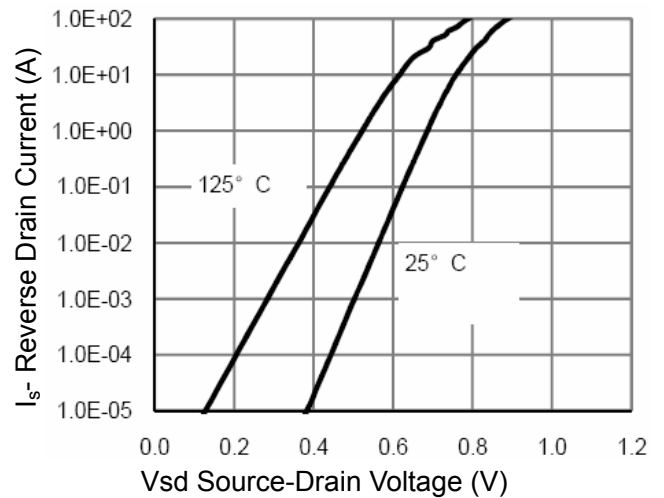


Figure 6 Source- Drain Diode Forward

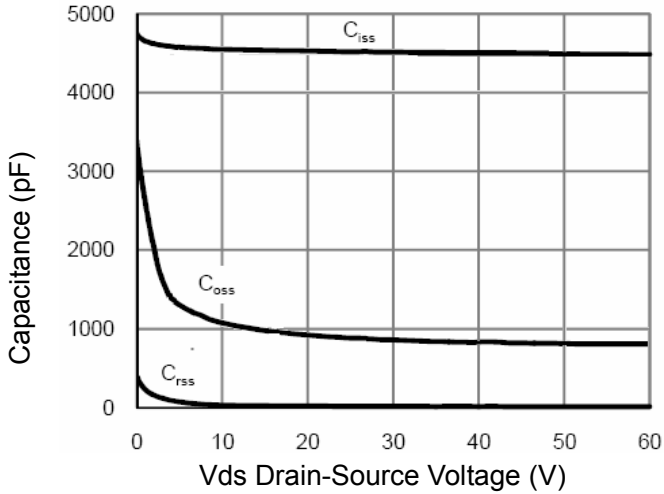


Figure 7 Capacitance vs Vds

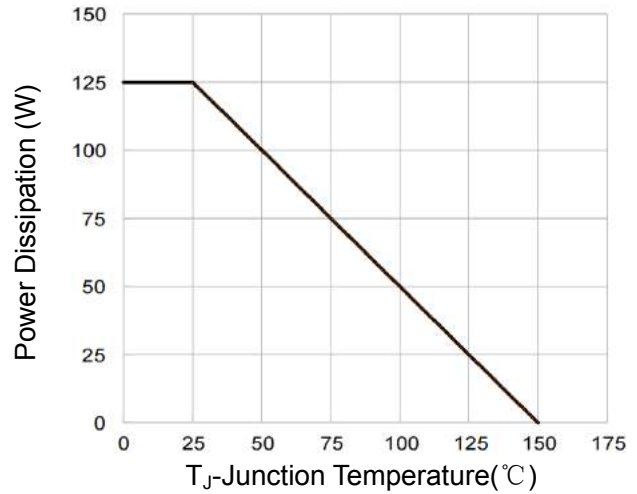


Figure 9 Power De-rating

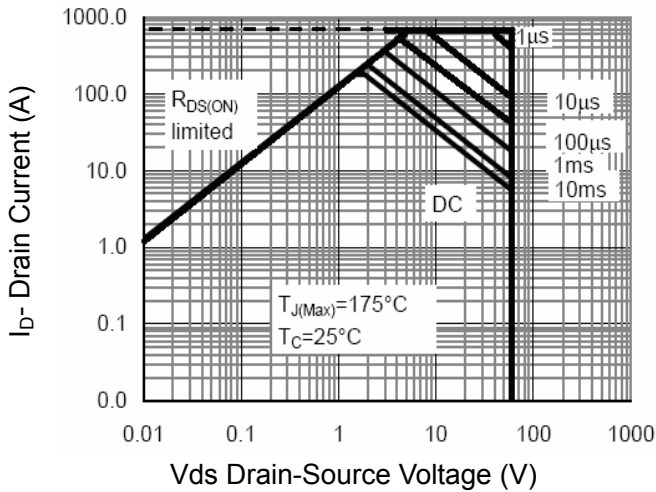


Figure 8 Safe Operation Area

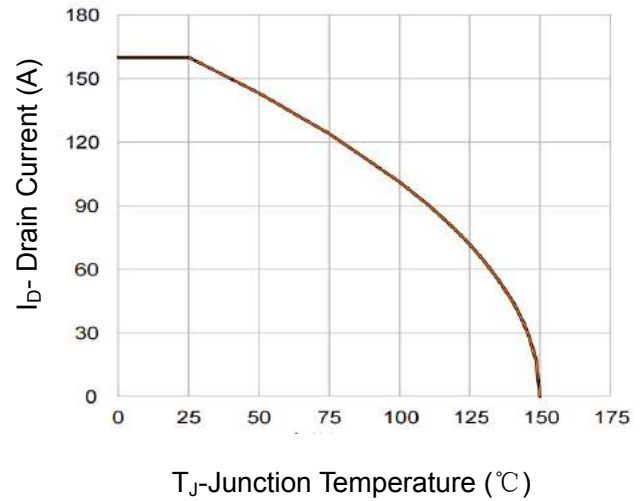


Figure 10 Current De-rating

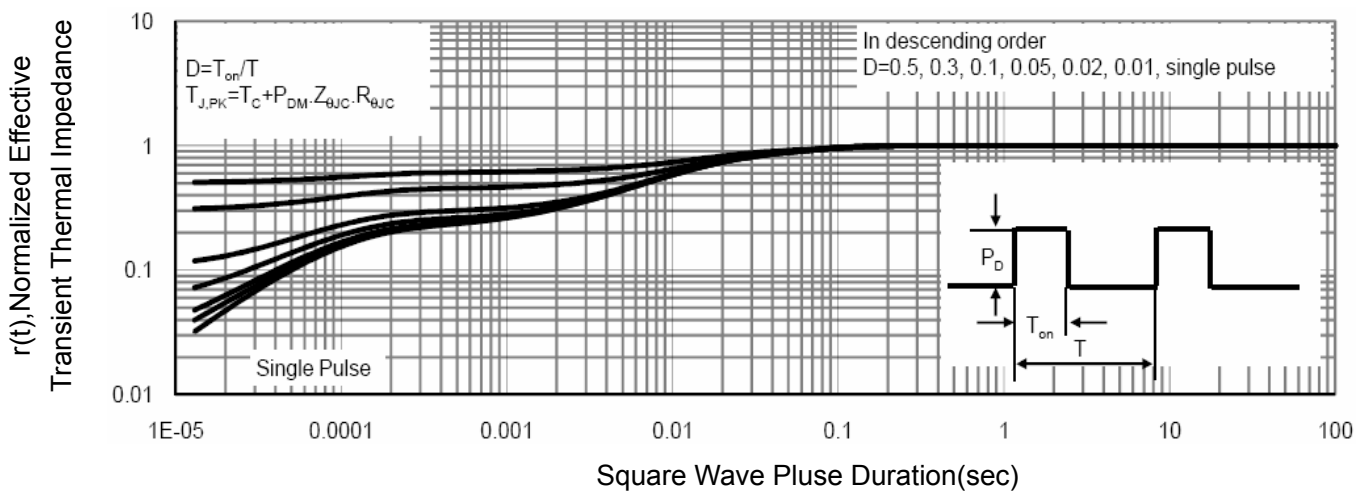
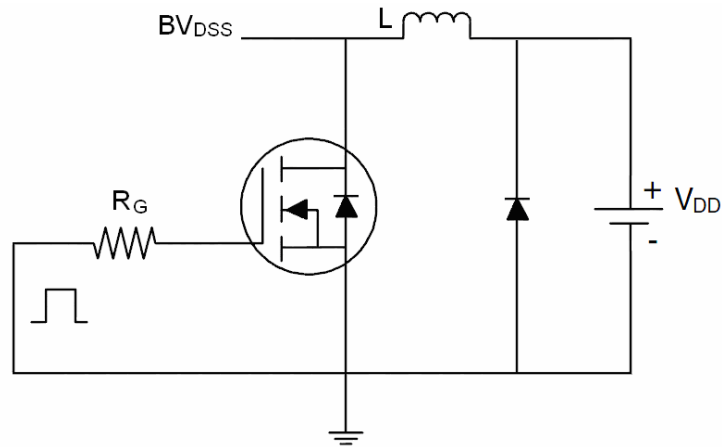


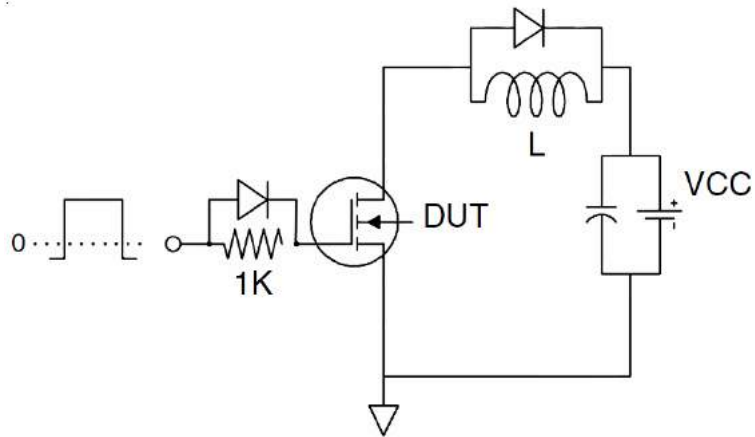
Figure 11 Normalized Maximum Transient Thermal Impedance

**Test Circuit**

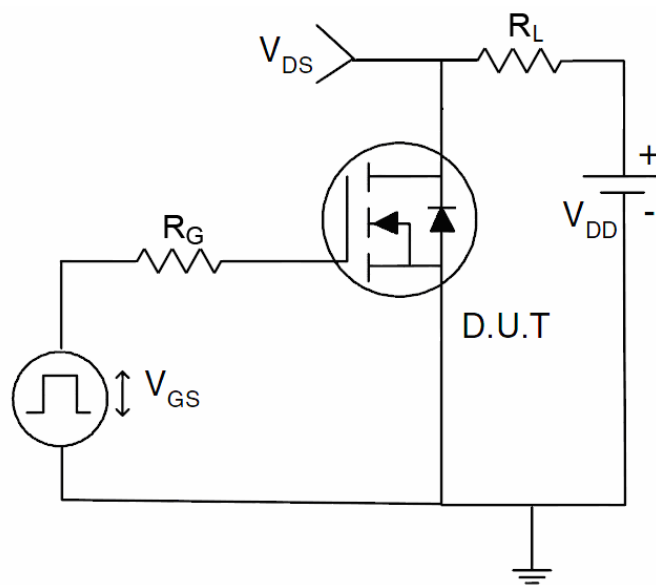
**1)  $E_{AS}$  test Circuit**



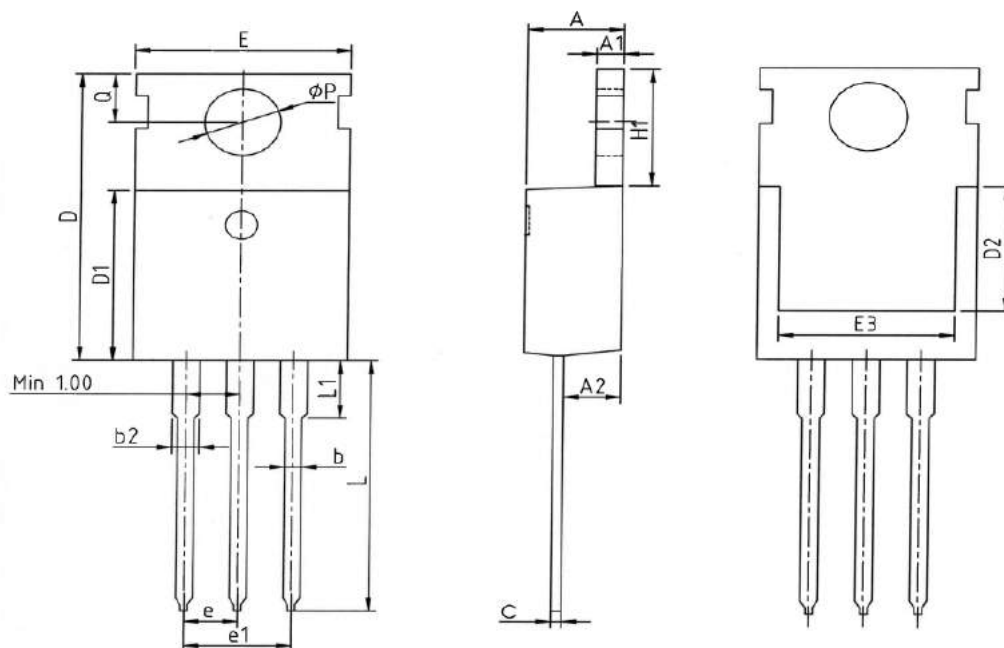
**2) Gate charge test Circuit**



**3) Switch Time Test Circuit**



## TO-220-3L Package Information



SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	6.30	7.10
E	9.70	10.00	10.30
E3	7.00	7.80	8.60
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

## Customer Service

Sales and Service:

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