

100V, 120A N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

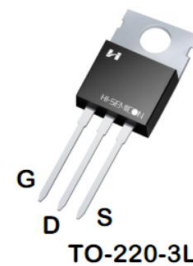
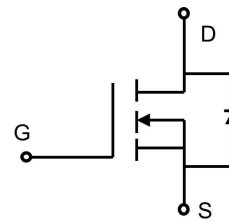
The SGP105R0T uses advanced SGT technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=100V$, $I_D=120A$
- ◆ $R_{DS(on)}$
TYP: $4.3m\Omega$ @ $V_{GS}=10V$

Applications

- ◆ Motor Driving in Power Tool, E-vehicle, Robotics
- ◆ Current Switching in DC/DC & AC/DC (SR) Sub-systems
- ◆ Power Management in Telecom., Industrial Automation, CE



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGP105R0T	TO-220-3L	SGP105R0T	Pb Free	Tube

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	120	A
	$T_C = 100^{\circ}\text{C}$		90	
Drain Current Pulsed(Note 1)		I_{DM}	480	
Power Dissipation($T_C=25^{\circ}\text{C}$)		P_D	192	W
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	729	mJ
Operation Junction Temperature Range		T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim+150$	
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.8	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	56	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDSS}	V _{GS} =0V, I _D =250μA	100	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	--	--	1.0	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2.0	3.0	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	--	4.3	5.0	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V, f=1.0MHZ	1	2.0	10	Ω
Input Capacitance	C _{iSS}	V _{DS} =50V V _{GS} =0V f=1.0MHZ	--	4335	--	pF
Output Capacitance	C _{oSS}		--	687	--	
Reverse Transfer Capacitance	C _{rSS}		--	20.9	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V V _{DS} =10V R _G =3Ω	--	16.7	--	ns
Turn-on Rise Time	t _r		--	21	--	
Turn-off Delay Time	t _{d(off)}		--	37	--	
Turn-off Fall Time	t _f		--	15.6	--	

Total Gate Charge	Q_g	$V_{DS}=50V, I_D=20A$ $V_{GS}=10V$ (Note 3.4)	--	64	--	nC
Gate-Source Charge	Q_{gs}		--	23	--	
Gate-Drain Charge	Q_{gd}		--	13.9	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	120	A
Pulsed Source Current	I_{SM}		--	--	480	
Diode Forward Voltage	V_{SD}	$I_S=30A, V_{GS}=0V$	--	0.8	1.2	V
Reverse Recovery Time	T_{rr}	$I_F=20A, V_R=10V,$ $dI_F/dt=100A/\mu S$	--	66	--	ns
Reverse Recovery Charge	Q_{rr}		--	136	--	nC

1. Pulse width limited by maximum junction temperature

2. $L=0.5mH, V_{DD}=50V, R_G=25\Omega$, starting $T_J=25^\circ C$

3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1: Saturation Characteristics

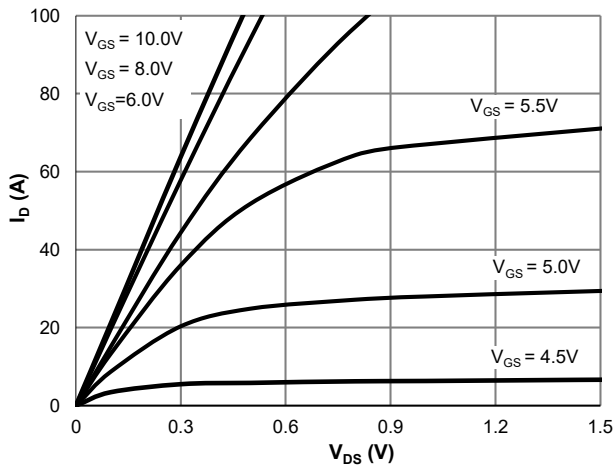


Figure 2: Transfer Characteristics

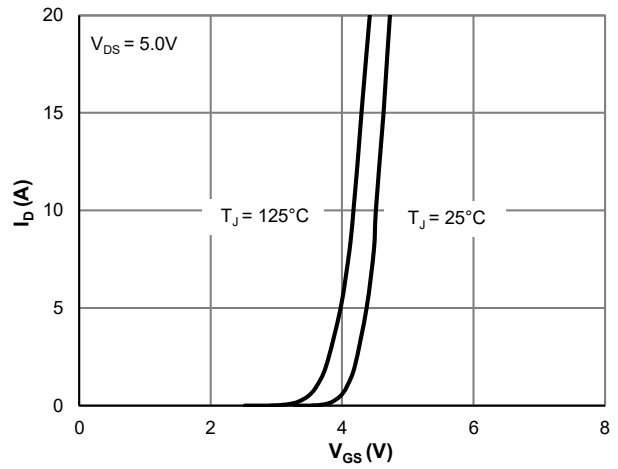


Figure 3: $R_{DS(ON)}$ vs. Drain Current

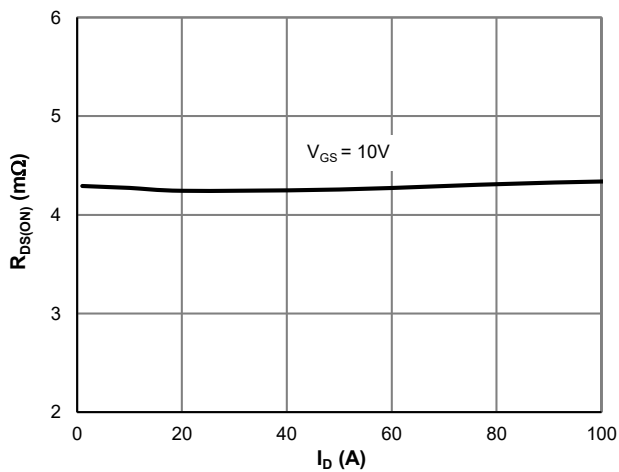


Figure 4: Body-Diode Characteristics

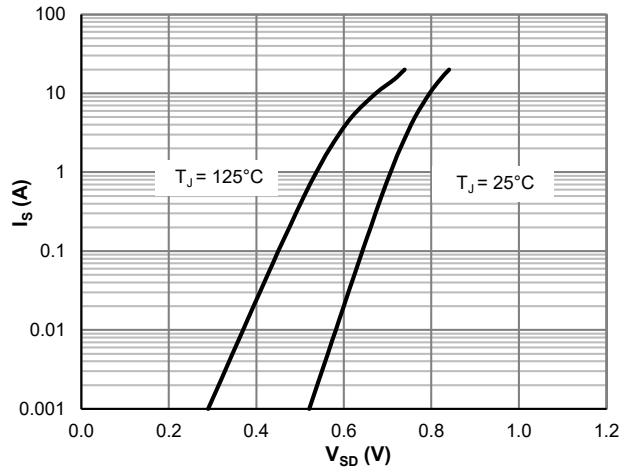


Figure 5: Capacitance Characteristics

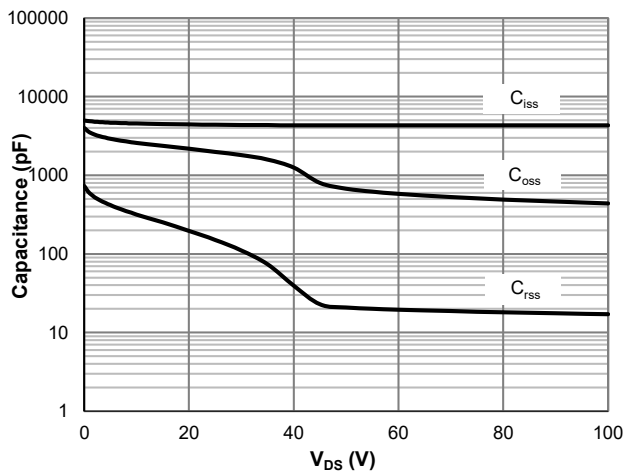
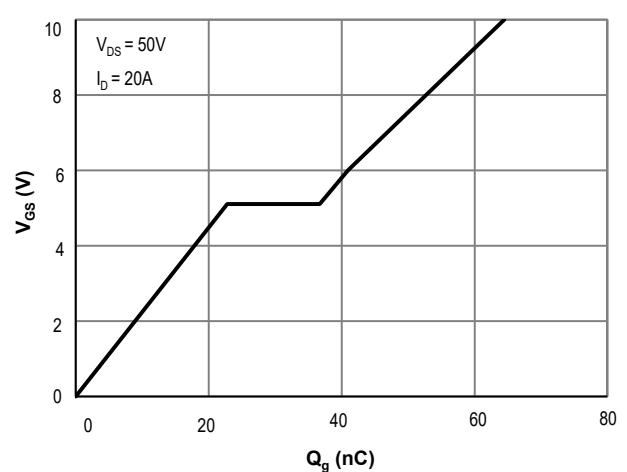


Figure 6: Gate Charge



Typical Performance Characteristics

Figure 7: $V_{BR(DSS)}$ vs. Junction Temperature

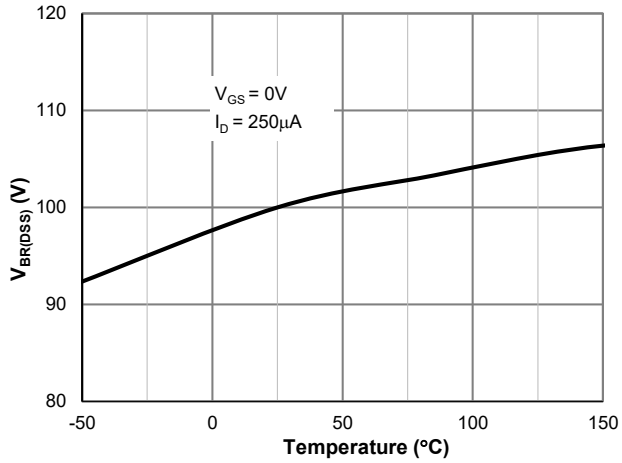


Figure 8: $R_{DS(ON)}$ vs. Junction Temperature

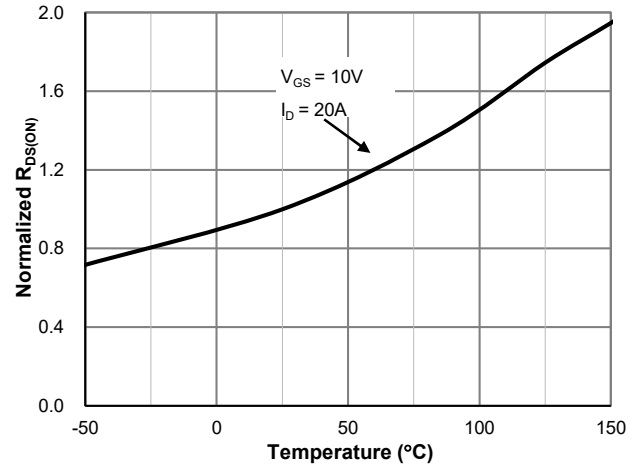


Figure 9: Current De-rating

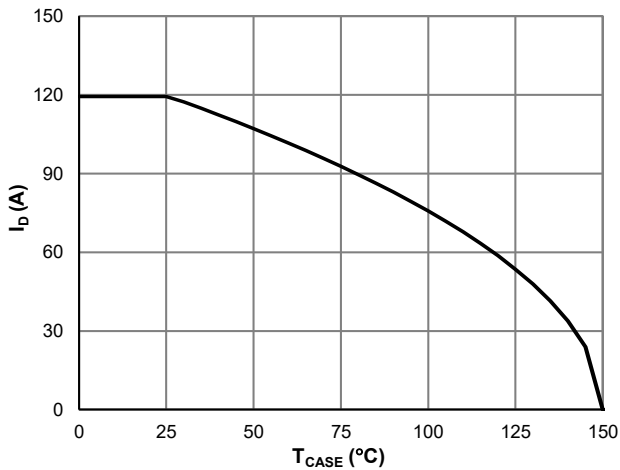


Figure 10: Power De-rating

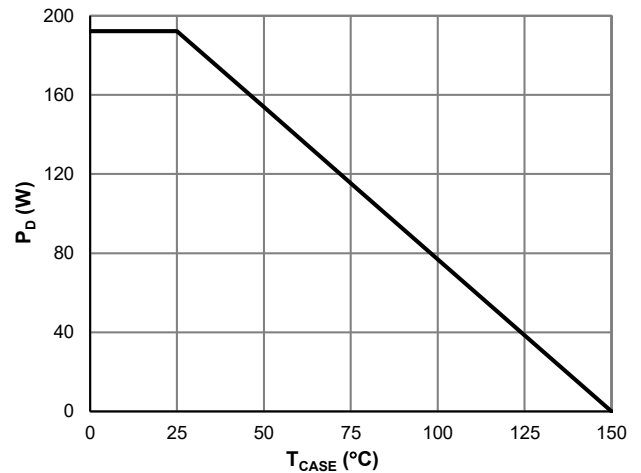
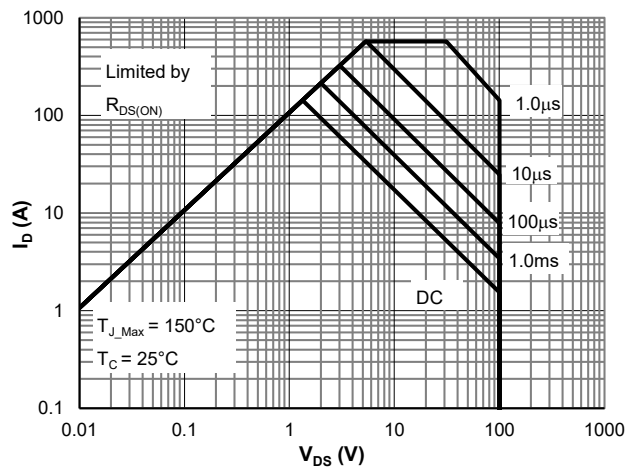
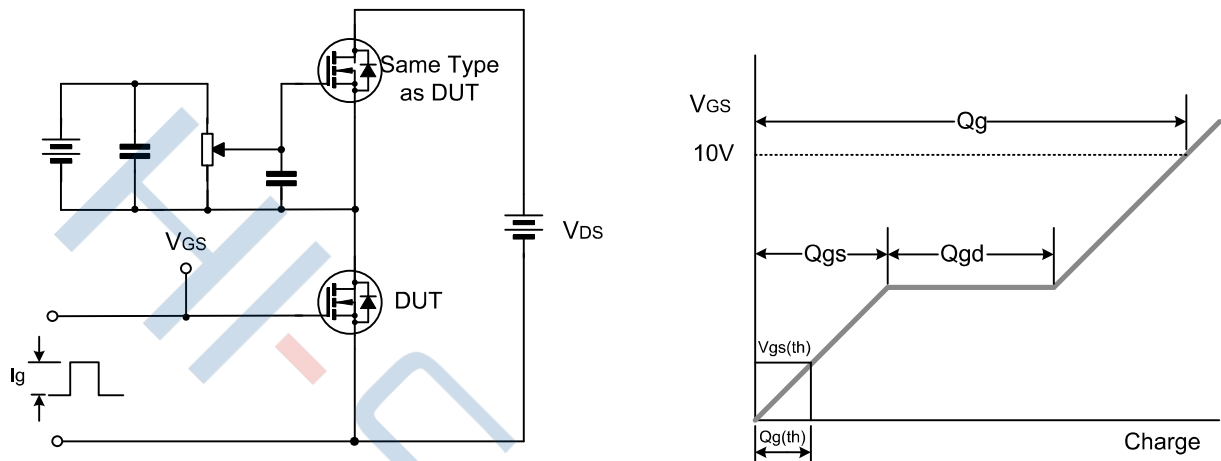


Figure 11: Maximum Safe Operating Area

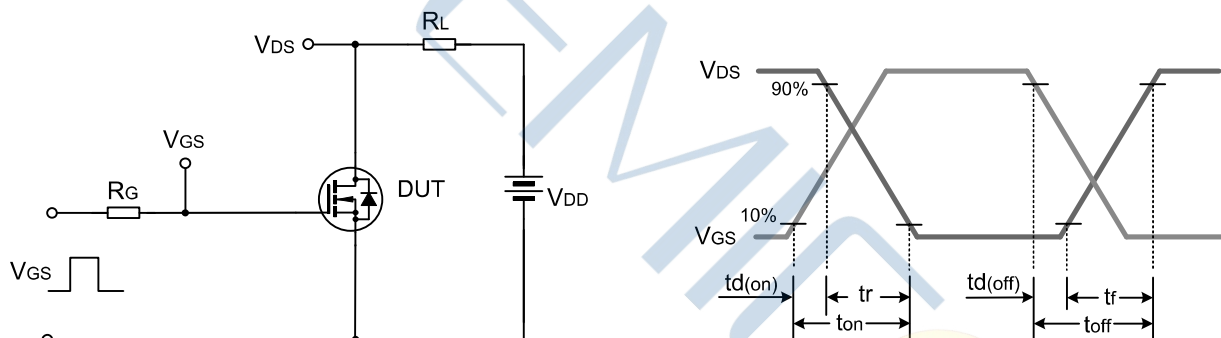


Test Circuit

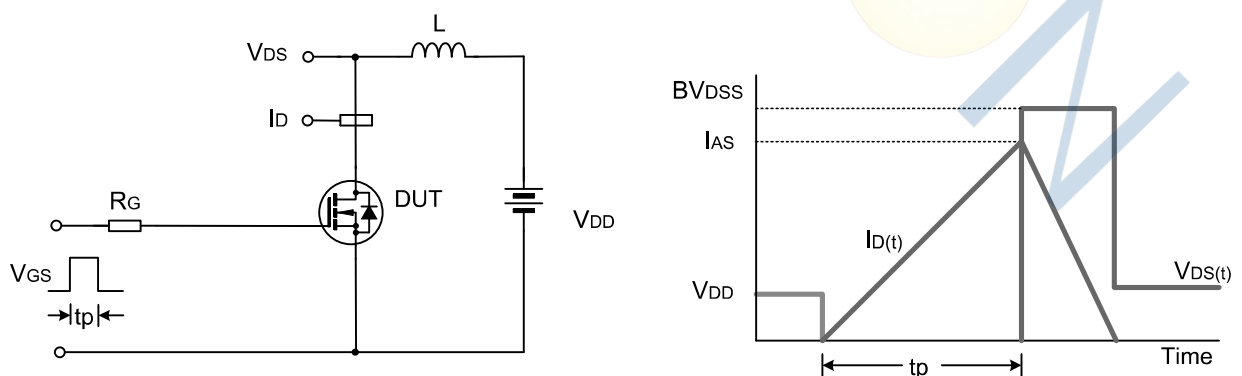
Gate Charge Test Circuit & Waveform



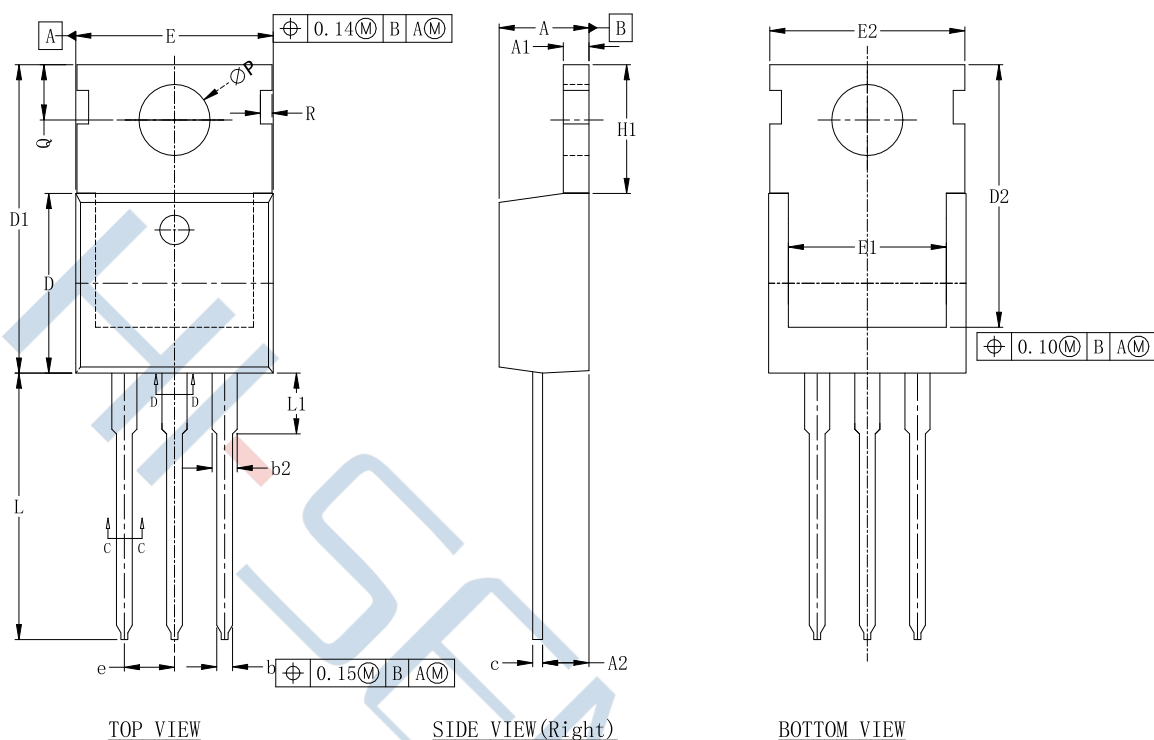
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-220-3L



DIM SYMBOL	MIN.	NOM.	MAX.
A	4.450	4.550	4.650
A1	1.240	1.340	1.440
A2	2.250	2.350	2.450
b	0.740	0.840	0.940
b1	0.700	0.800	0.900
b2	1.210	1.310	1.410
b3	1.170	1.270	1.370
c	0.440	0.540	0.640
c1	0.400	0.500	0.600
D	9.000	9.100	9.200
D1	15.420	15.620	15.820
D2	13.100	13.300	13.500
E	9.900	10.000	10.100
E1	7.800	8.000	8.200
E2	9.680	9.880	10.080
e	2.540 BSC.		
H1	6.420	6.520	6.620
L	13.300	13.500	13.700
L1	2.880	3.080	3.280
□P	3.500	3.600	3.700
Q	2.600	2.800	3.000
R	0.590 REF.		

Disclaimer:

- ▶ Hi-semicon reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- ▶ All semiconductor products malfunction or fail with some probability under special conditions. When using Hi-semicon products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Hi-semicon products could cause loss of body injury or damage to property.
- ▶ Hi-semicon will supply the best possible product for customers!