

## P-Channel Enhancement Mode Power MOSFET

### Description

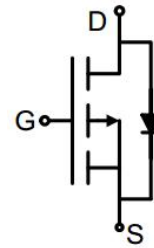
The 3401 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

### General Features

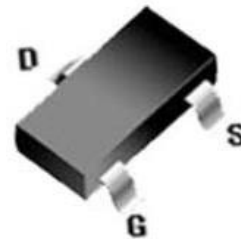
- $V_{DS}$  -30V
- $I_D$  (at  $V_{GS} = -10V$ ) -4.2A
- $R_{DS(ON)}$  (at  $V_{GS} = -10V$ ) < 55m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = -4.5V$ ) < 69m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = -2.5V$ ) < 102m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant

### Application

- Power switch
- DC/DC converters



Schematic diagram



SOT-23

### Ordering Information

Device	Package	Marking	Packaging
3401	SOT-23	3401	3000pcs/Reel

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Continuous Drain Current	$I_D$	-4.2	A
Pulsed Drain Current (note1)	$I_{DM}$	-17	A
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Power Dissipation	$P_D$	1.2	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 To 150	$^\circ\text{C}$

### Thermal Resistance

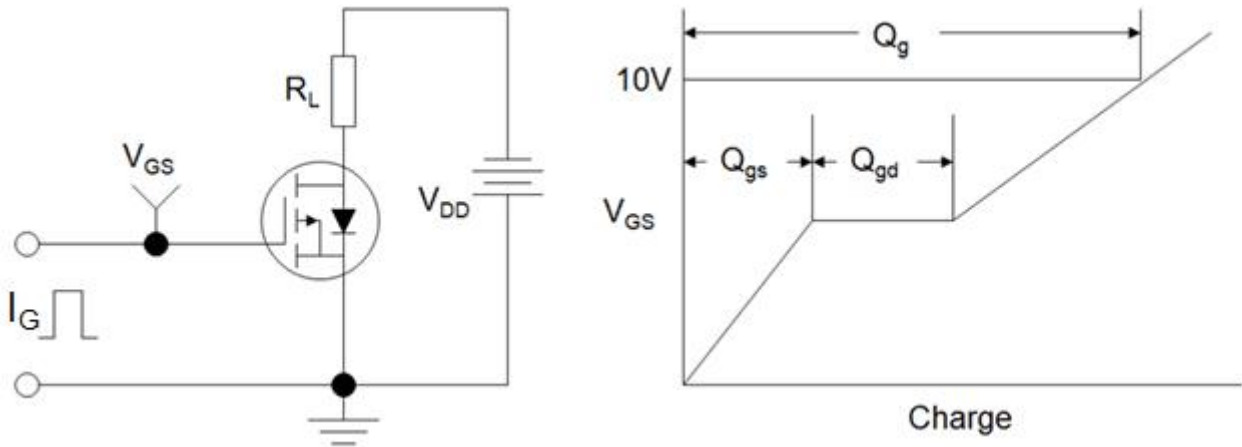
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	104	$^\circ\text{C/W}$

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30V, V_{GS} = 0V$	--	--	-1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 12V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.6	-0.8	-1.3	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -4A$	--	42	55	m $\Omega$
		$V_{GS} = -4.5V, I_D = -4A$	--	49	69	
		$V_{GS} = -2.5V, I_D = -2A$	--	64	102	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5V, I_D = -4A$	--	10	--	S
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = -15V,$ $f = 1.0MHz$	--	756	--	pF
Output Capacitance	$C_{oss}$		--	68	--	
Reverse Transfer Capacitance	$C_{rss}$		--	60	--	
Total Gate Charge	$Q_g$	$V_{DD} = -15V,$ $I_D = -4A,$ $V_{GS} = -4.5V$	--	8.5	--	nC
Gate-Source Charge	$Q_{gs}$		--	1.8	--	
Gate-Drain Charge	$Q_{gd}$		--	2.7	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15V,$ $I_D = -4A,$ $R_G = 6\Omega$	--	7	--	ns
Turn-on Rise Time	$t_r$		--	3	--	
Turn-off Delay Time	$t_{d(off)}$		--	30	--	
Turn-off Fall Time	$t_f$		--	12	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	-4.2	A
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = -4A, V_{GS} = 0V$	--	--	-1.2	V
Reverse Recovery Charge	$Q_{rr}$	$I_F = -4A, V_{GS} = 0V$ $di/dt = -100A/\mu s$	--	8	--	nC
Reverse Recovery Time	$T_{rr}$		--	14	--	ns

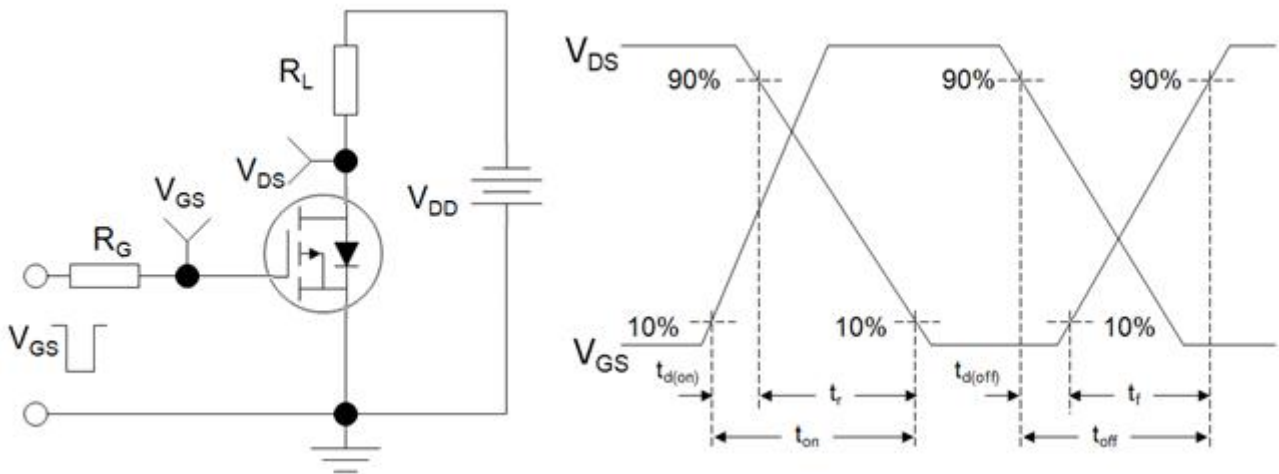
### Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$

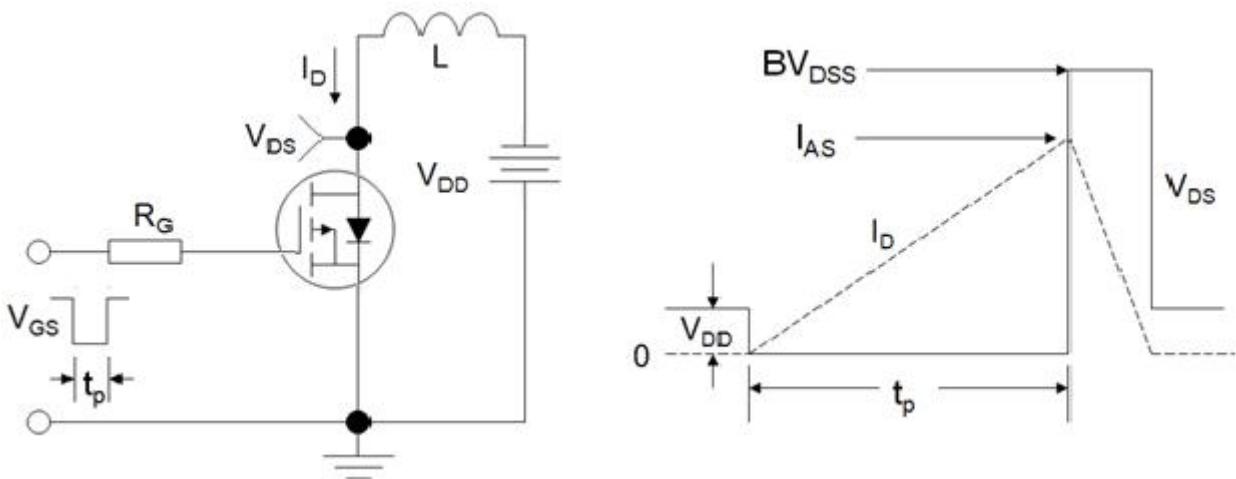
### Gate Charge Test Circuit



### Switch Time Test Circuit

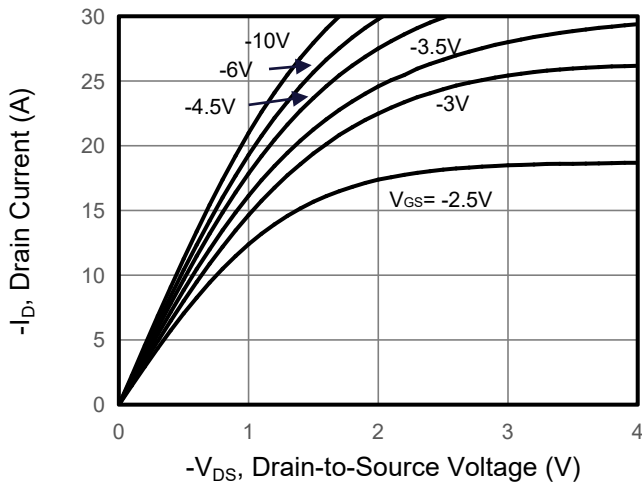


### EAS Test Circuit

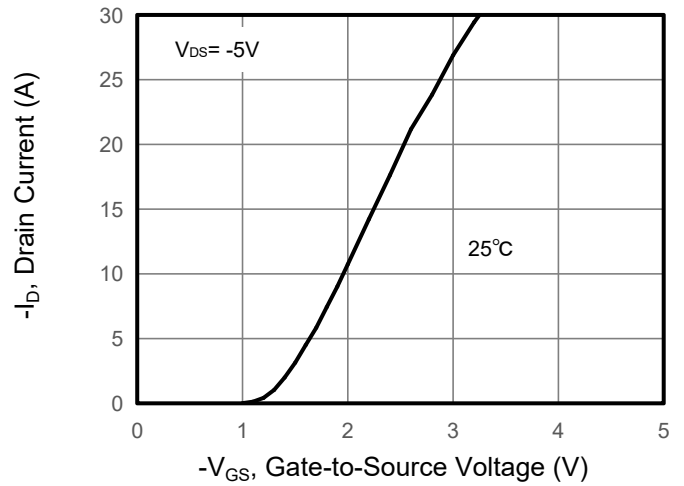


Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

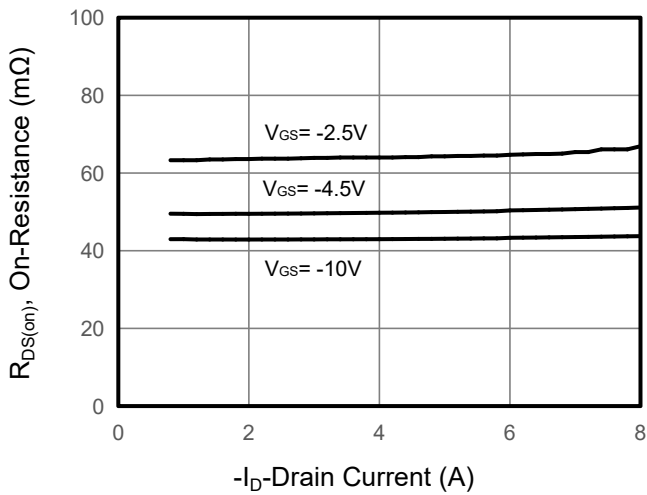
**Figure 1. Output Characteristics**



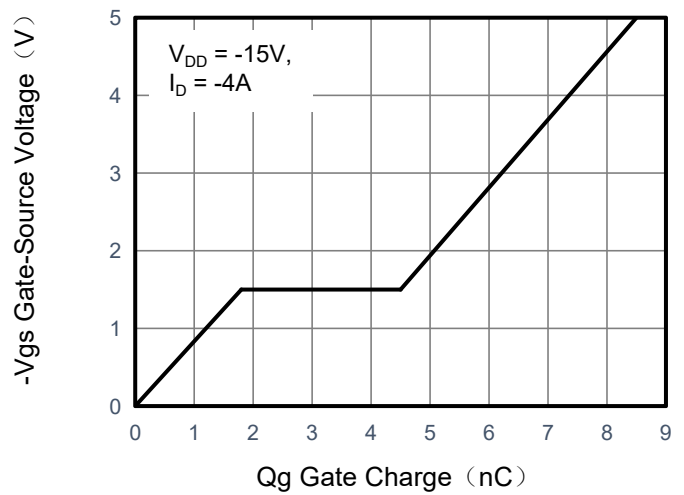
**Figure 2. Transfer Characteristics**



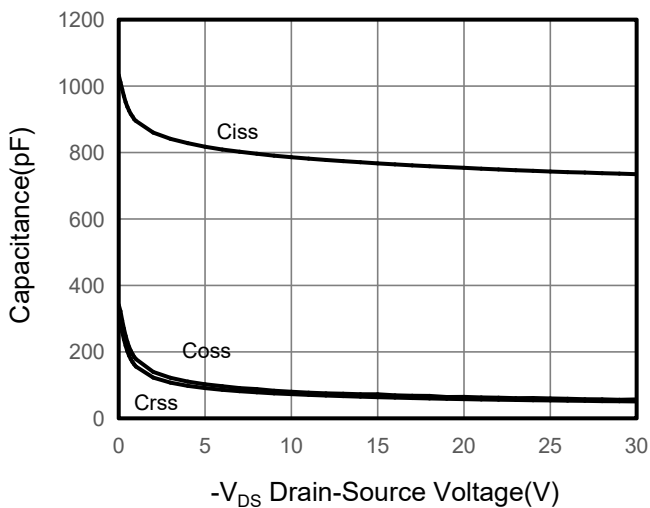
**Figure 3. Drain Source On Resistance**



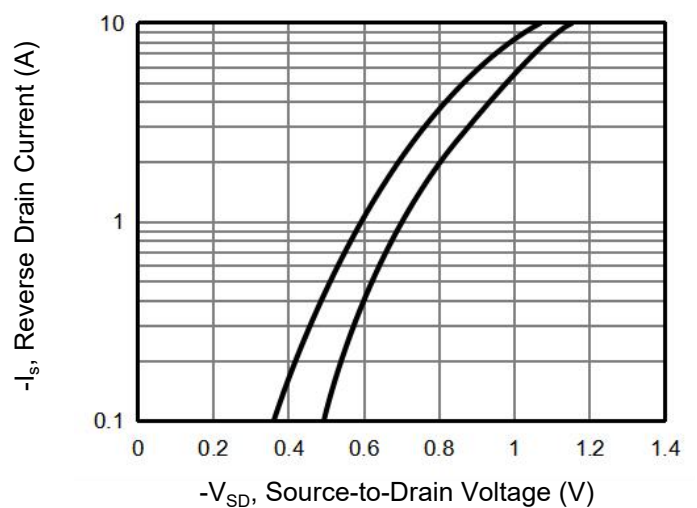
**Figure 4. Gate Charge**



**Figure 5. Capacitance**



**Figure 6. Source-Drain Diode Forward**



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

Figure 7. Drain-Source On-Resistance

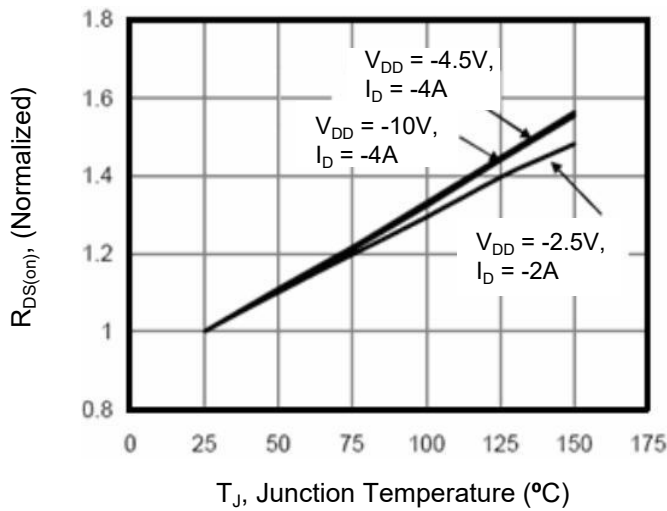


Figure 10. Safe Operation Area

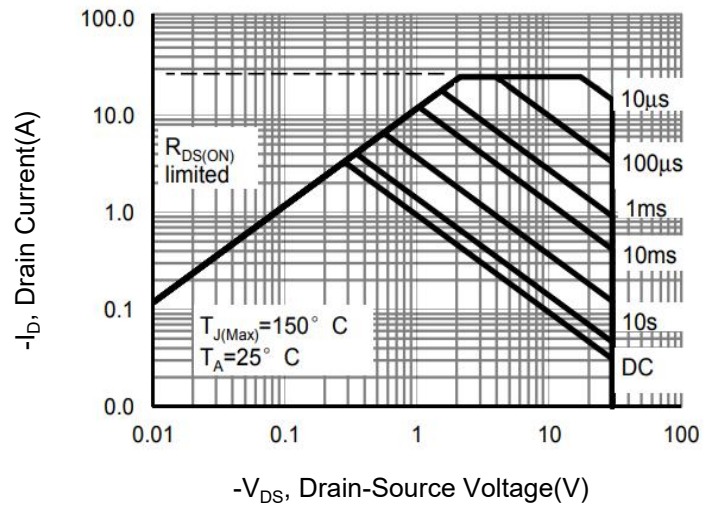
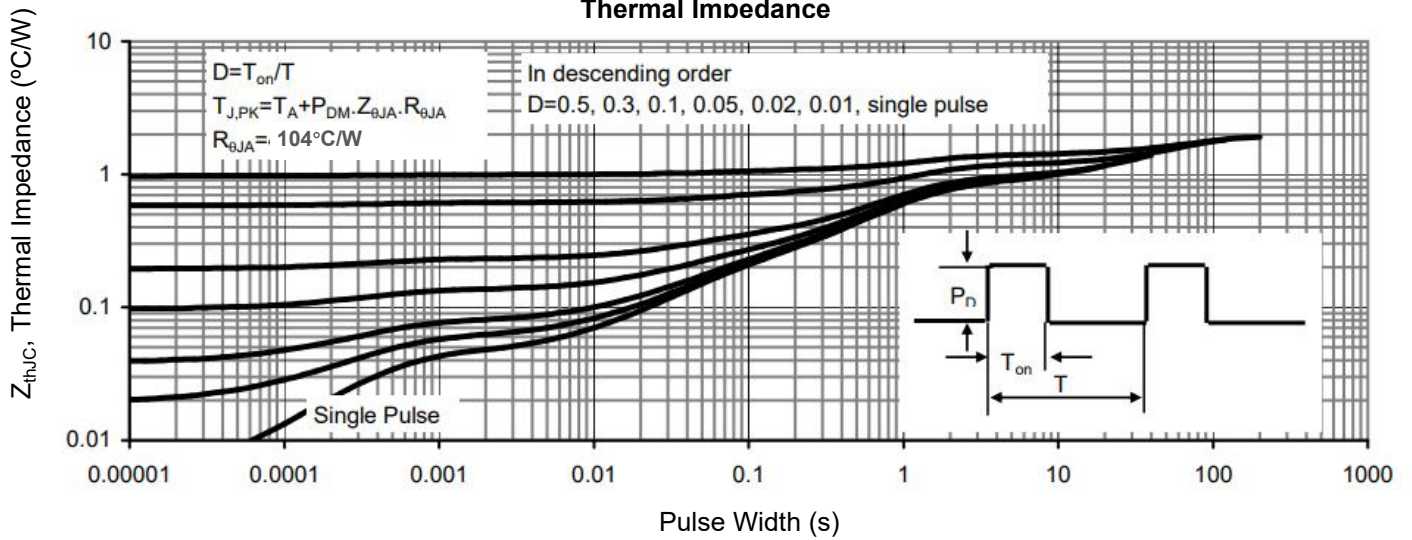
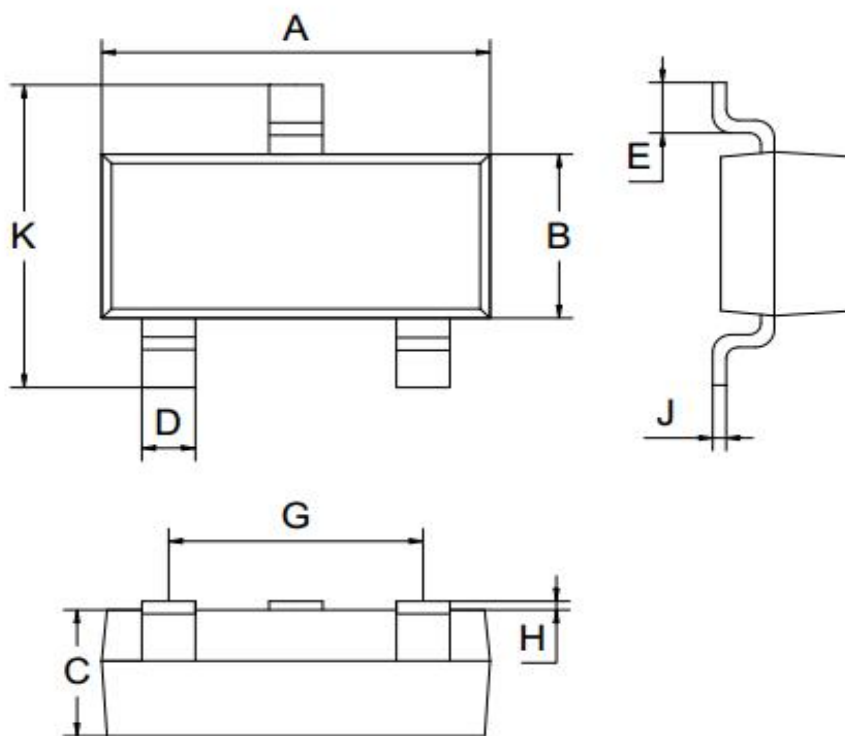


Figure 9. Normalized Maximum Transient Thermal Impedance



## SOT-23-3L Package Information



SOT-23-3L			
Dim	MIN	NOM	MAX
A	2.80	2.90	3.00
B	1.50	1.60	1.70
C	1.00	1.10	1.20
D	0.30	0.40	0.50
E	0.25	0.40	0.55
G	1.90		
H	0.00	-	0.10
J	0.047	0.127	0.207
K	2.60	2.80	3.00
All Dimensions in mm			