

GC2M080120K

Silicon Carbide Power MOSFET N-Channel Enhancement Mode

V_{DS}	=	1200	V
$R_{DS(on)}$	=	80	m
$I_{D@25^{\circ}C}$	=	36	A

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

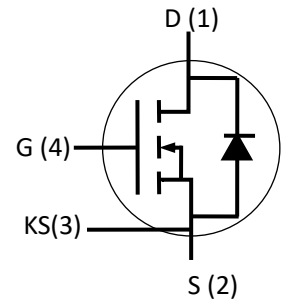
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

Package



Part Number	Package
GC2M080120K	TO-247-4

Maximum Ratings ($T_c = 25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1200	V	$V_{GS}=0V, I_D=100\mu A$	
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	36 24	A	$V_{GS}=20V, T_c=25^{\circ}C$ $V_{GS}=20V, T_c=100^{\circ}C$	
I_{DM}	Pulse Drain Current	60	A	Pulse width limited by T_{jmax}	
P_D	Power Dissipation	166	W	$T_c=25^{\circ}C, T_J=150^{\circ}C$	Fig. 10
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +150	$^{\circ}C$		

Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.4	4.0	V	$V_{GS}=V_{DS}, I_{DS}=5mA, T_C=25^\circ C$	Fig. 6
			1.73			$V_{GS}=V_{DS}, I_{DS}=5mA, T_C=150^\circ C$	
I_{DSS}	Zero Gate Voltage Drain Current		1	100	μA	$V_{DS}=1200V, V_{GS}=0V$	
I_{GSS}	Gate-Source Leakage Current		20	200	nA	$V_{GS}=20V, V_{DS}=0V$	
$R_{DS(on)}$	Drain-Source on-state Resistance		80	98	m Ω	$V_{GS}=20V, I_D=20A, T_C=25^\circ C$	Fig. 4
			120			$V_{GS}=20V, I_D=20A, T_C=150^\circ C$	
g_{fs}	Transconductance		7.0		S	$V_{GS}=20V, I_D=20A, T_J=25^\circ C$	Fig. 5
			6.6			$V_{GS}=20V, I_D=20A, T_J=150^\circ C$	
C_{iss}	Input Capacitance		2016		pF	$V_{GS}=0V, V_{DS}=1000V, f=1MHz$ $V_{AC}=25mV$	Fig. 8
C_{oss}	Output Capacitance		72.6				
C_{rss}	Reverse Transfer Capacitance		17.9				
E_{ON}	Turn-On Switching Energy		180		μJ	$V_{DS}=800V, V_{GS}=-5/20V, I_D=20A,$ $R_{G(ext)}=5\Omega, L=142\mu H$	
E_{OFF}	Turn-Off Switching Energy		70				
$t_{d(on)}$	Turn-On Delay Time		23		ns	$V_{DD}=800V, V_{GS}=-5/20V$ $I_D=20A, R_{G(ext)}=5\Omega,$ $R_L=40\Omega, \text{Timing relative to } V_{DS}$	
t_r	Rise Time		60				
$t_{d(off)}$	Turn-Off Delay Time		17				
t_f	Fall Time		12				
$R_{G(int)}$	Internal Gate Resistance		2.8		Ω	$f=1MHz, V_{AC}=25mV$	
Q_{gs}	Gate to Source Charge		23		nC	$V_{DD}=800V, V_{GS}=-5/20V$ $I_D=20A$	Fig. 9
Q_{gd}	Gate to Drain Charge		26				
Q_g	Total Gate Charge		85				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.5		V	$V_{GS}=-5V, I_{SD}=10A, T_J=25^\circ C$	Fig. 7
		3.3		V	$V_{GS}=-5V, I_{SD}=10A, T_J=150^\circ C$	
I_S	Continuous Diode Forward Current		28	A	$T_C=25^\circ C$	
t_{rr}	Reverse Recovery time	18		ns	$V_{GS}=-5V, I_{SD}=20A, V_R=800V,$ $dif/dt=1200A/\mu s;$	
Q_{rr}	Reverse Recovery Charge	80		nC		
I_{rrm}	Peak Reverse Recovery Current	8.0		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.75	$^\circ C/W$		Fig. 11
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	36			

Typical Performance

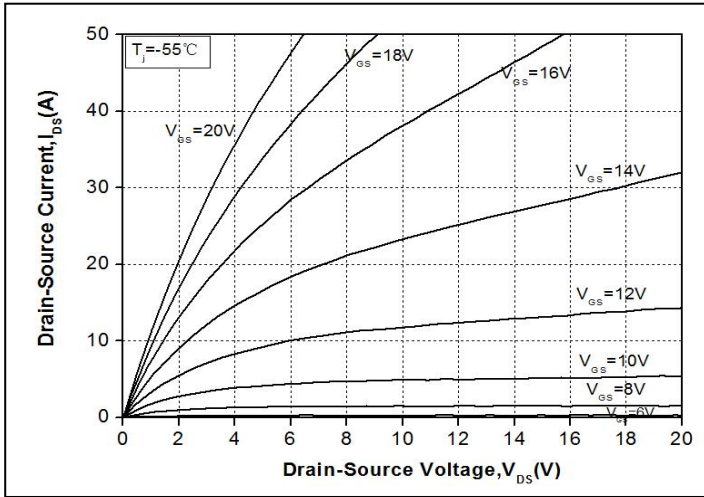


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

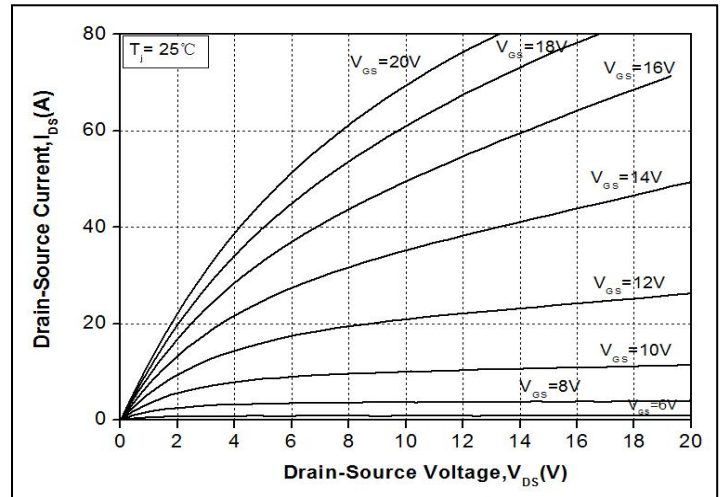


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

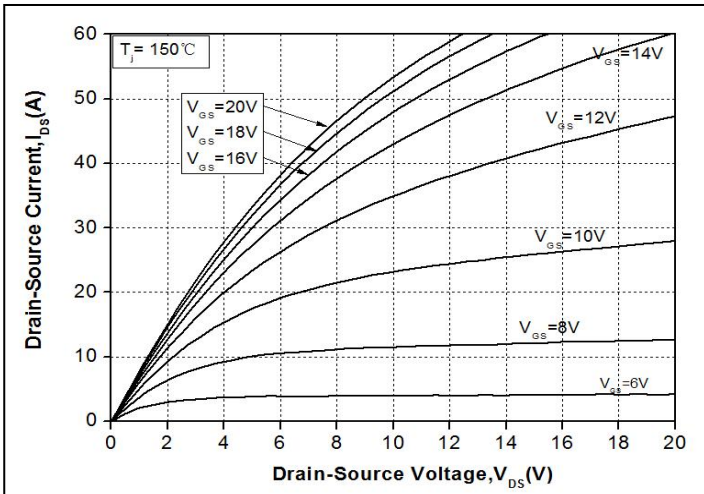


Figure 3. Output Characteristics $T_j = 150^\circ\text{C}$

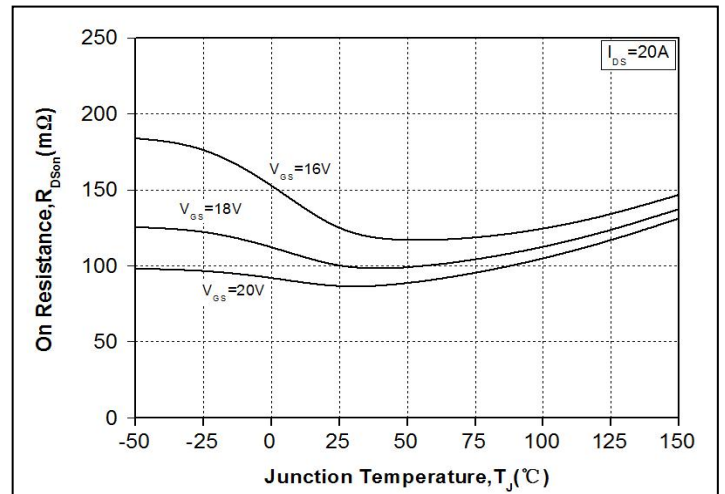


Figure 4. On-Resistance For Various Gate Voltage

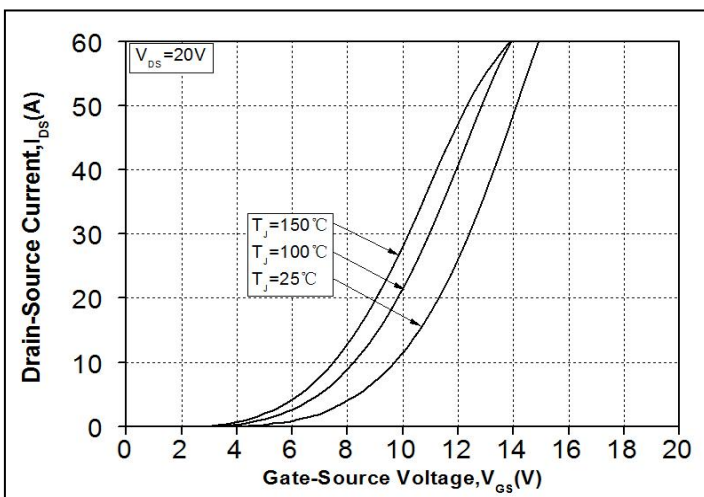


Figure 5. Transfer Characteristic

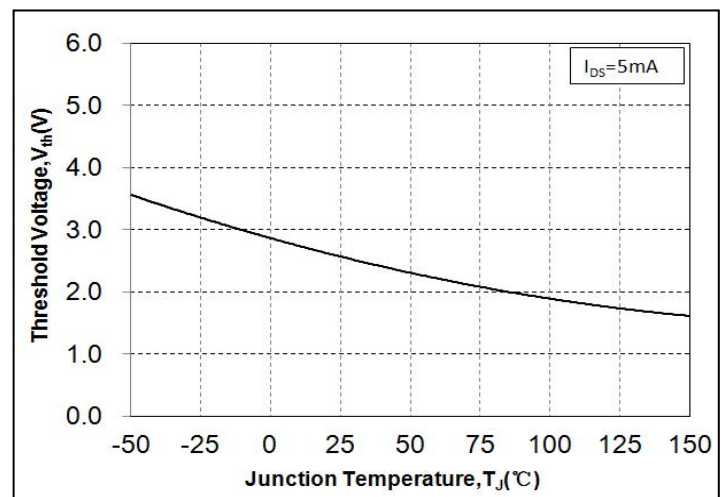


Figure 6. Threshold Voltage vs. Temperature for Various Junction Temperatures

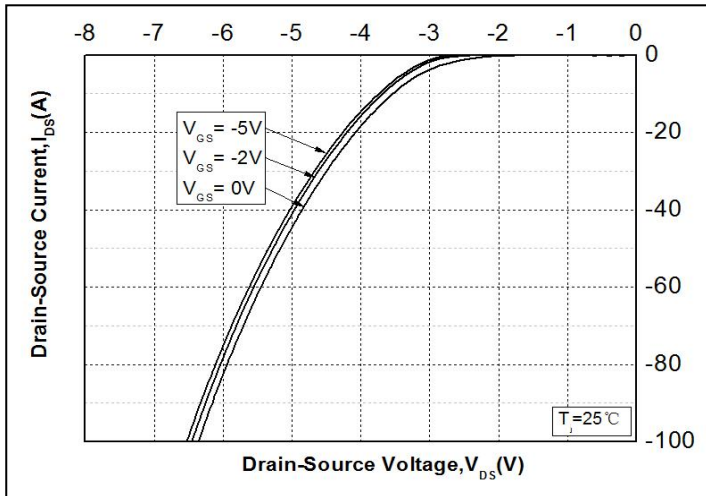


Figure 7. Body Diode Characteristics

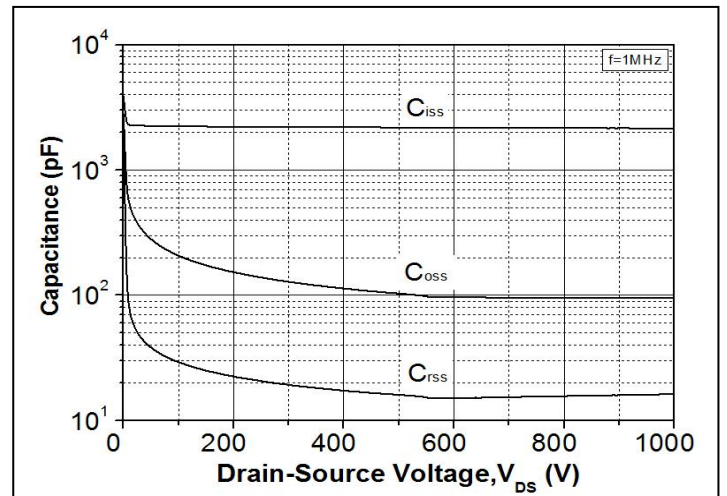


Figure 8. Capacitances vs. Drain-Source Voltage

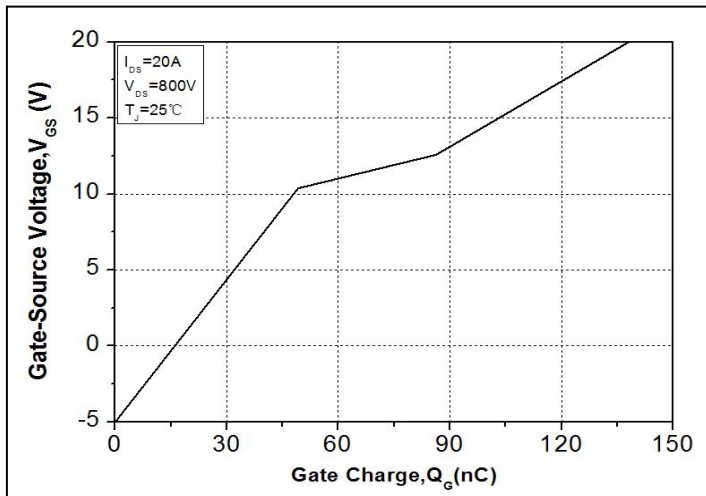


Figure 9. Gate Charge Characteristics

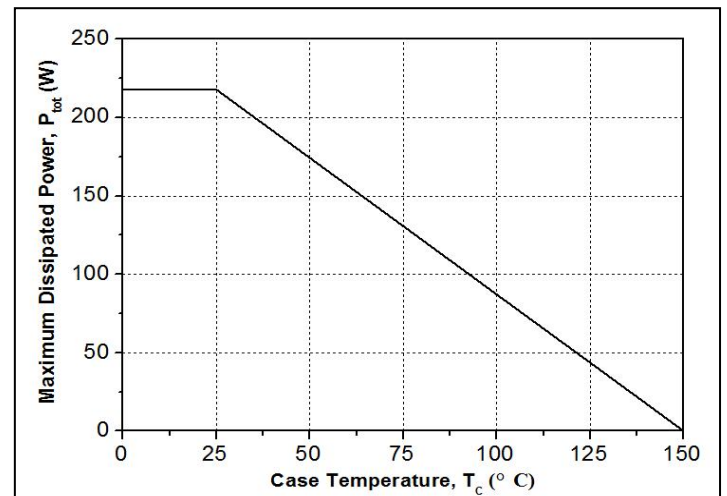


Figure 10. Power Dissipation Derating

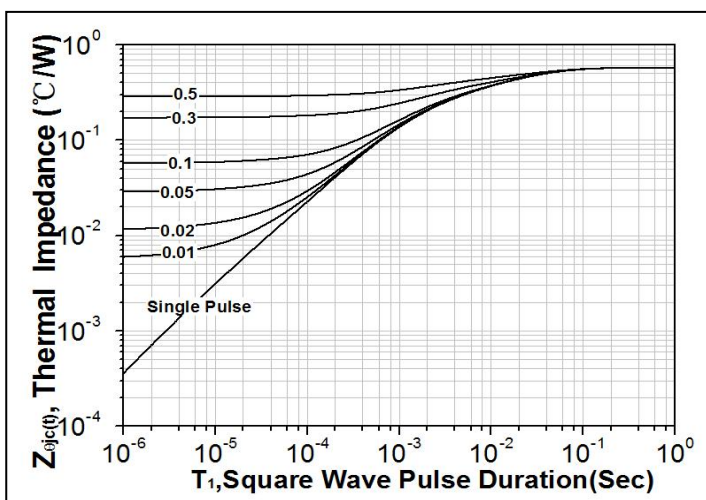
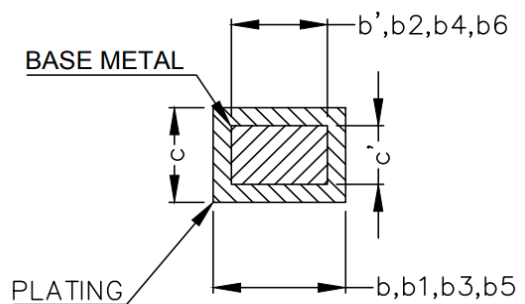
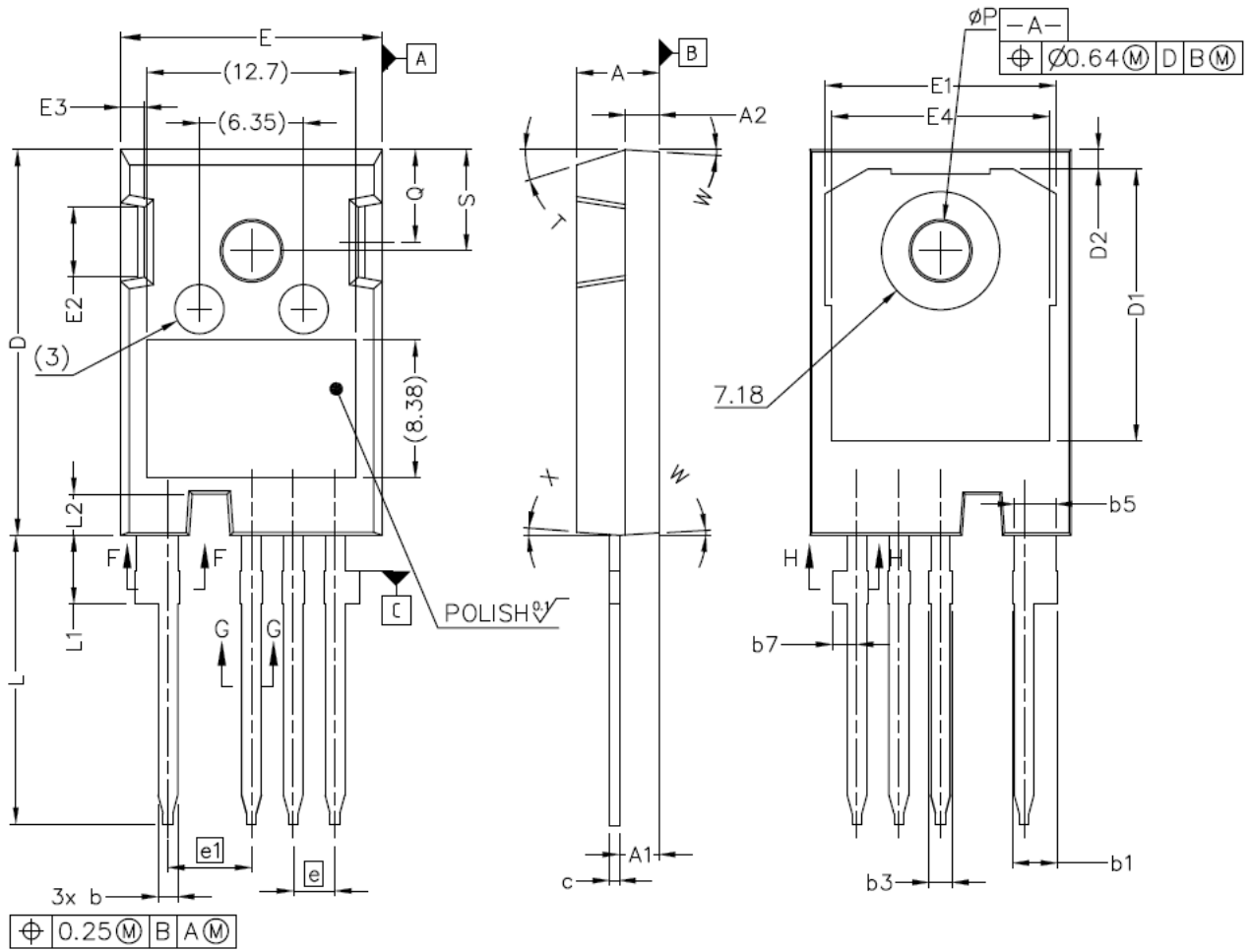


Figure 11. Transient Thermal Impedance

Package Dimensions: TO-247-4



SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

Package Dimensions: TO-247-4

NOTE ;

1. ALL METAL SURFACES: TIN PLATED, EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS.
ANGLES ARE IN DEGREES.
4. 'N' IS THE NUMBER OF TERMINAL POSITIONS

SYM	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b`	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
b7	1.30	1.70
c`	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13

SYM	MILLIMETERS	
	MIN	MAX
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N*	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
Ø P	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	

