NCE N-Channel Enhancement Mode Power MOSFET

General Description

The VCRR7560K uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

Product Summary

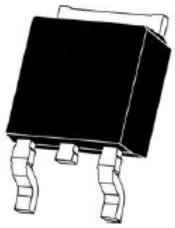
BV_{DSS}	typ.	84	V
$R_{DS(ON)}$	typ.	6.8	mΩ
	max.	8.5	mΩ
I_D		60	A

Features

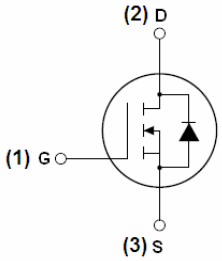
- V_{DS}=75V；I_D=60A@ V_{GS}=10V；
  $R_{DS(ON)}$<8.5mΩ @ V_{GS}=10V
- Special process technology for high ESD capability
- Special designed for Convertors and power controls
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



TO-252-2L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package
CVRR7560K		TO-252-2L

Table 1. Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS}=0V)	V_{DS}	75	V
Gate-Source Voltage (V_{DS}=0V)	V_{GS}	±20	V
Drain Current (DC) at Tc=25℃	$I_{D\ (DC)}$	60	A
Drain Current (DC) at Tc=100℃	$I_{D\ (DC)}$	42	A
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_{DM\ (pluse)}$	310	A
Peak diode recovery voltage	dv/dt	30	V/ns
Maximum Power Dissipation(Tc=25℃)	P_D	140	W
Derating factor		0.95	W/℃
Single pulse avalanche energy (Note 2)	E_{AS}	300	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.EAS condition：Tj=25℃,VDD=37.5V,VG=10V,L=0.5mH

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance，Junction-to-Case（Maximum）	R_{thJC}	1.05	℃/W
Thermal Resistance，Junction-to-Ambient （Maximum）	R_{thJA}	50	℃/W

Table 3. Electrical Characteristics (T_C=25℃unless otherwise noted)

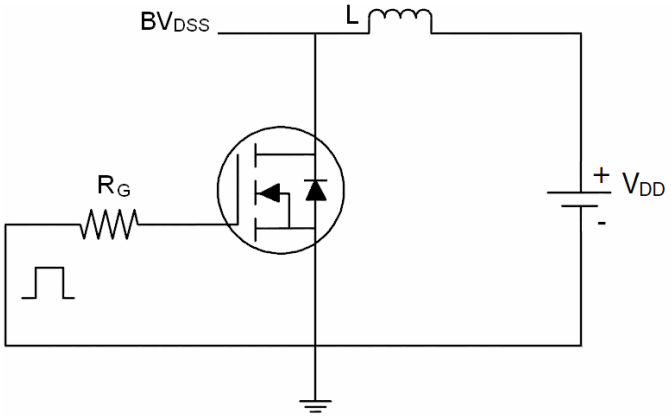
Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	75	84	-	V
Zero Gate Voltage Drain Current(Tc=25℃)	I_{DSS}	V_{DS}=75V,V_{GS}=0V	-	-	1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I_{DSS}	V_{DS}=75V,V_{GS}=0V	-	-	10	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=30A	-	6.8	8.5	mΩ
Dynamic Characteristics						
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=30A		66	-	S
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz		4400	-	PF
Output Capacitance	C_{oss}			340	-	PF
Reverse Transfer Capacitance	C_{rss}			260	-	PF
Total Gate Charge	Q_g	V_{DS}=30V,I_D=30A, V_{GS}=10V		100	-	nC
Gate-Source Charge	Q_{gs}			20	-	nC
Gate-Drain Charge	Q_{gd}			30	-	nC
Switching times						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=2A,R_L=15Ω V_{GS}=10V,R_G=2.5Ω	-	17.8	-	nS
Turn-on Rise Time	t_r		-	11.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	nS
Turn-Off Fall Time	t_f		-	14.6	-	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}		-	-	80	A
Pulsed Source-drain current(Body Diode)	I_{SDM}		-	-	320	A
Forward on voltage(Note 1)	V_{SD}	Tj=25℃,I_{SD}=30A,V_{GS}=0V	-	-	1.2	V
Reverse Recovery Time(Note 1)	t_{rr}	Tj=25℃,I_F=75A,di/dt=100A/μs	-	-	36	nS
Reverse Recovery Charge(Note 1)	Q_{rr}		-	-	56	nC
Forward Turn-on Time	t_{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

Notes

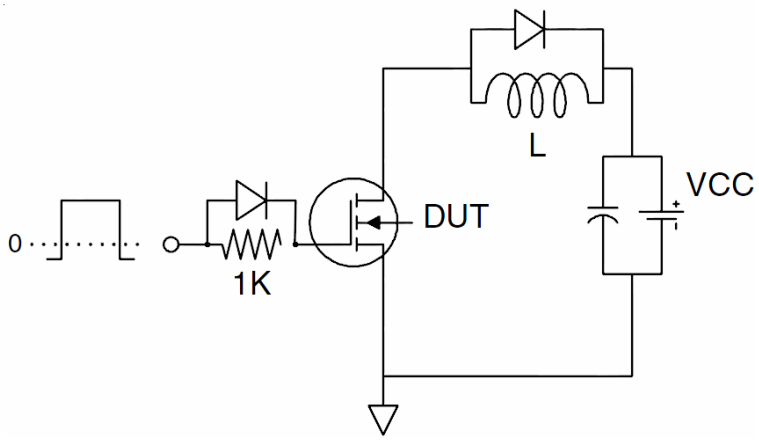
1.Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1.5%, R_G=25Ω, Starting Tj=25℃

Test Circuit

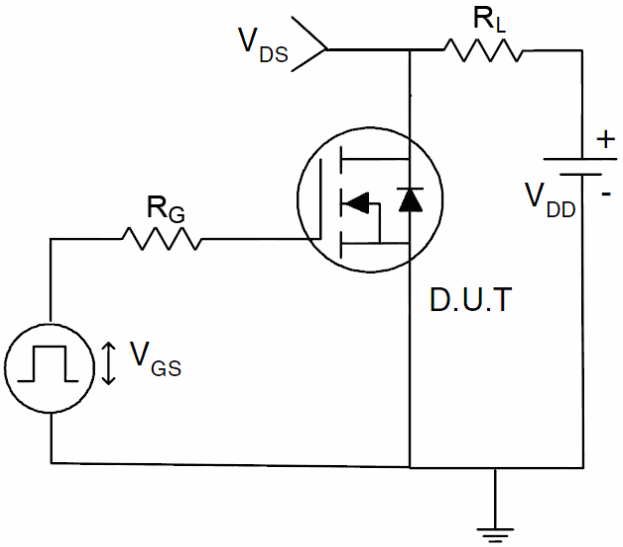
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (curves)

Figure1. Safe operating area

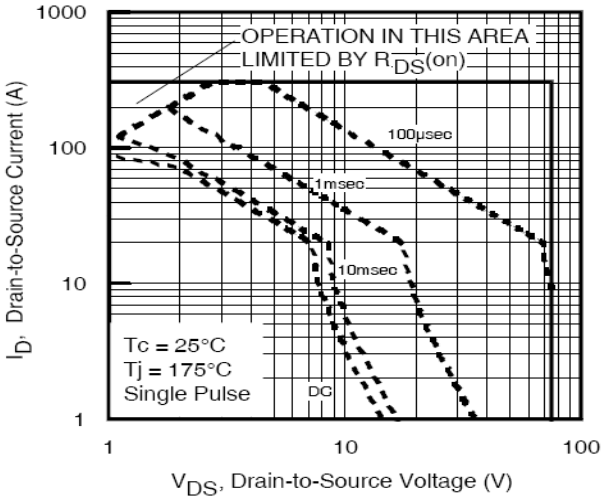


Figure2. Source-Drain Diode Forward Voltage

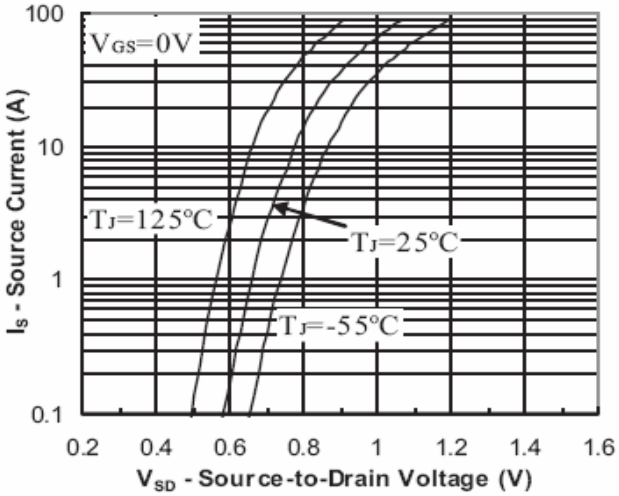


Figure3. Output characteristics

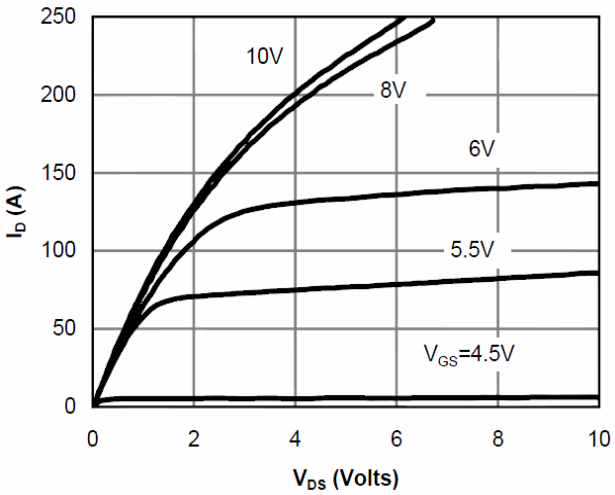


Figure4. Transfer characteristics

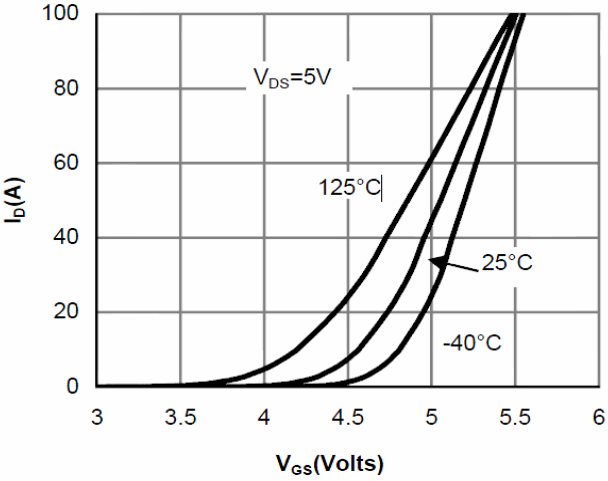


Figure5. Static drain-source on resistance

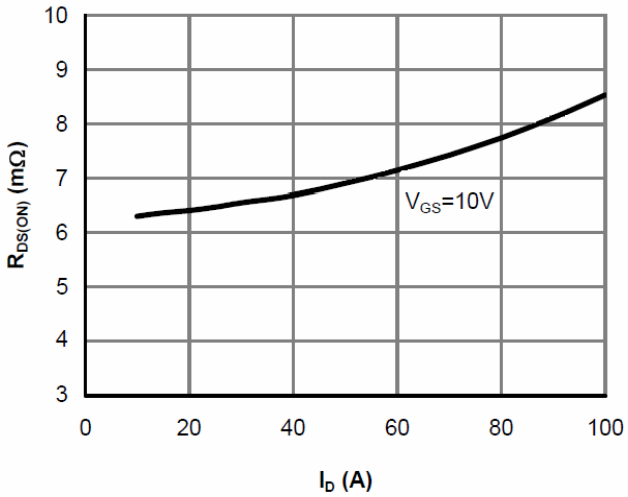


Figure6. $R_{DS(ON)}$ vs Junction Temperature

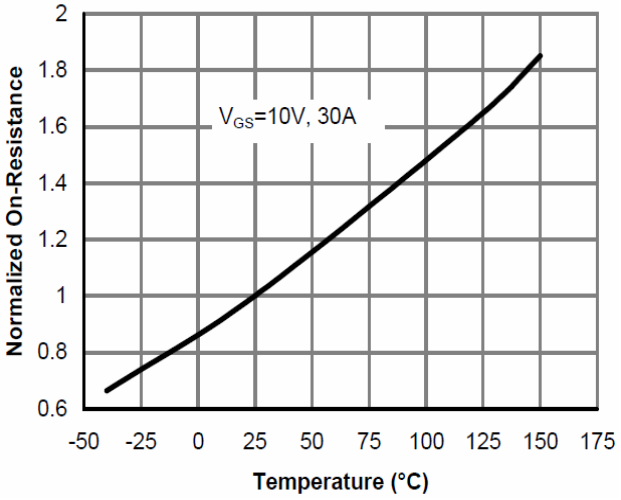


Figure7. BV_{DSS} vs Junction Temperature

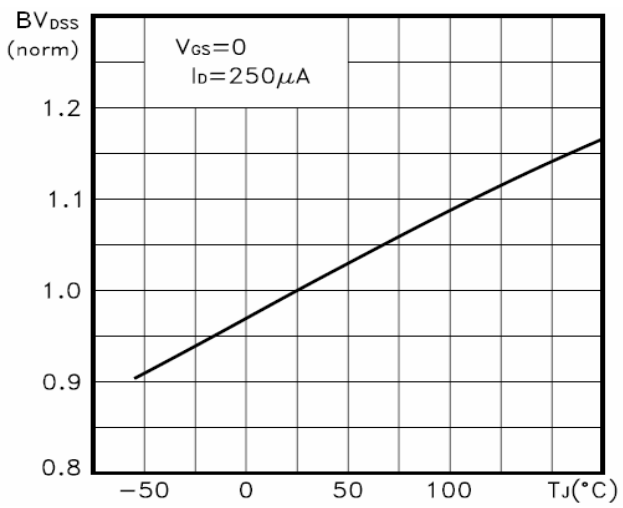


Figure8. $V_{GS(th)}$ vs Junction Temperature

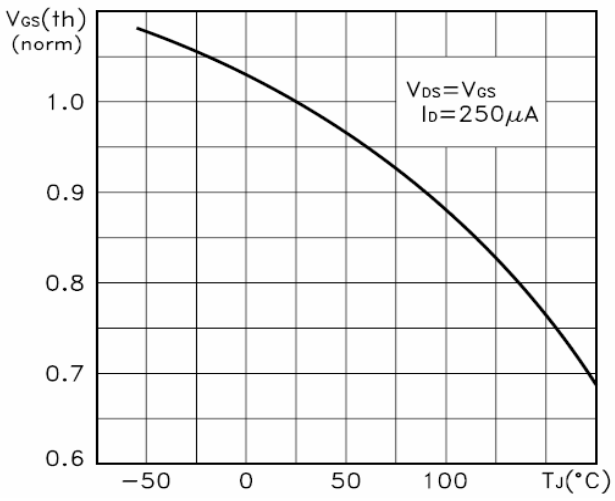


Figure9. Gate charge waveforms

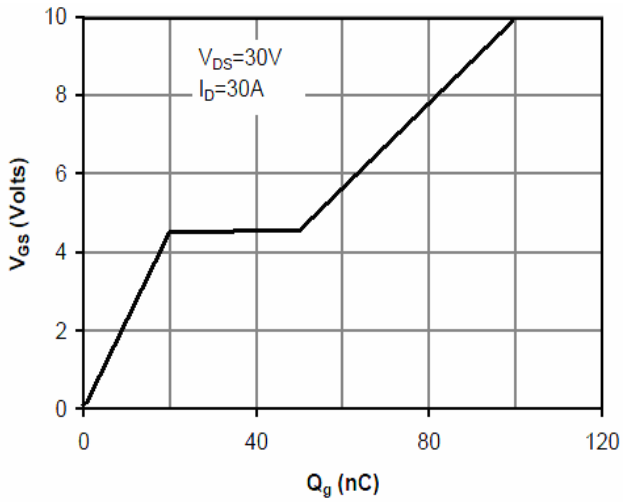


Figure10. Capacitance

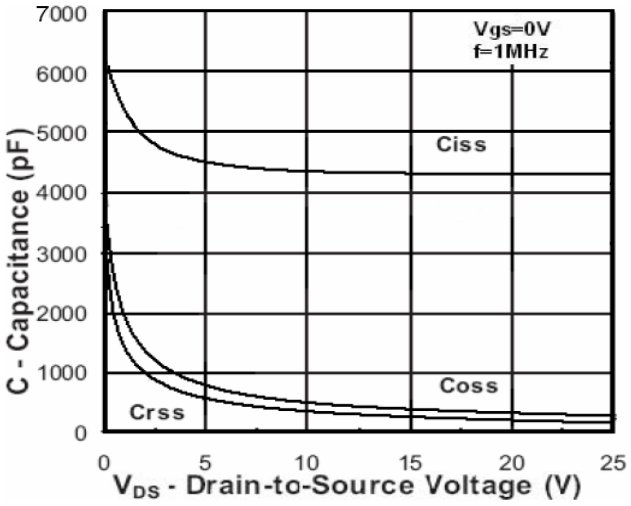
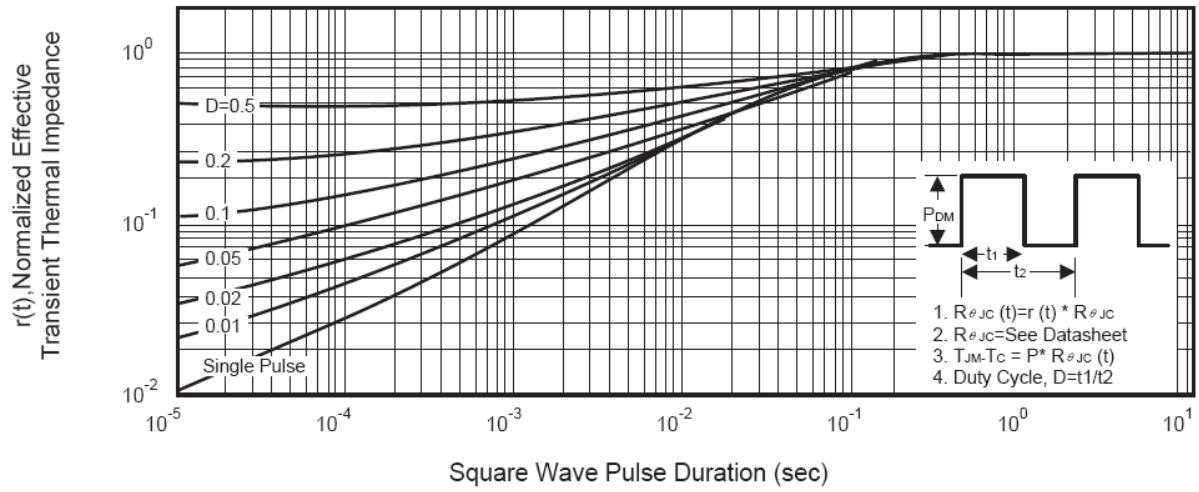
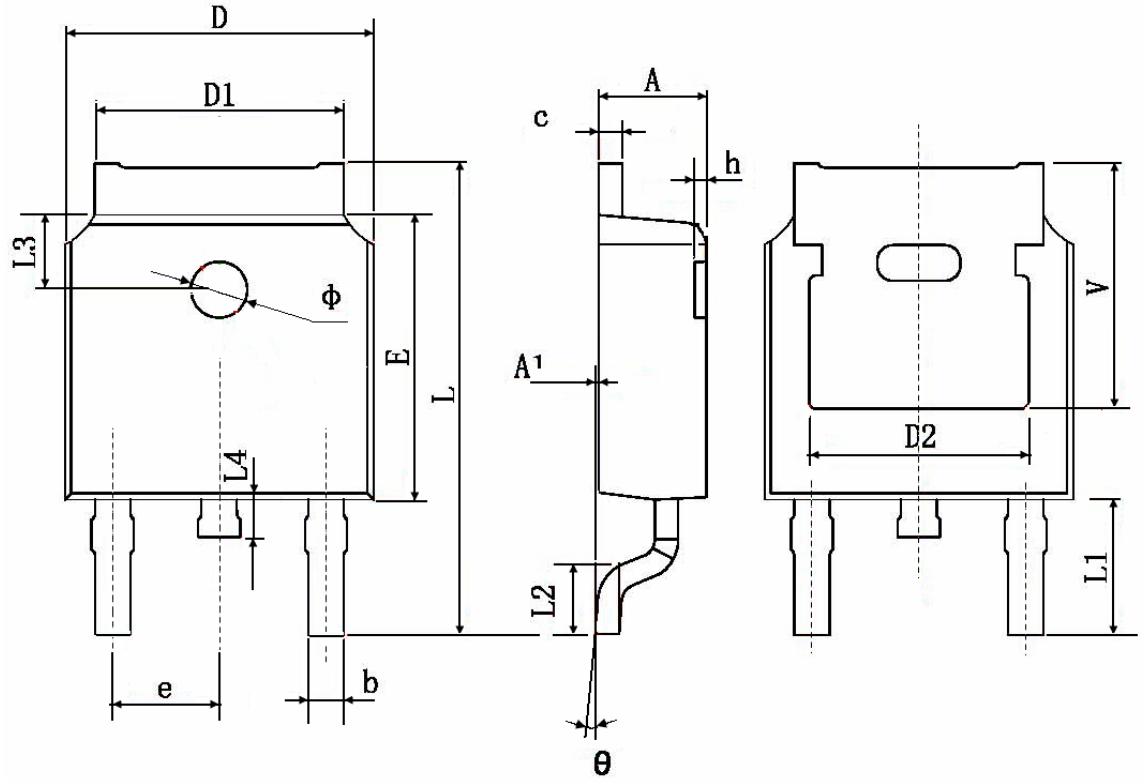


Figure11. Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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