

Cell Data Sheet Specification



**2012 PV Module Reliability
Workshop**

Golden, CO

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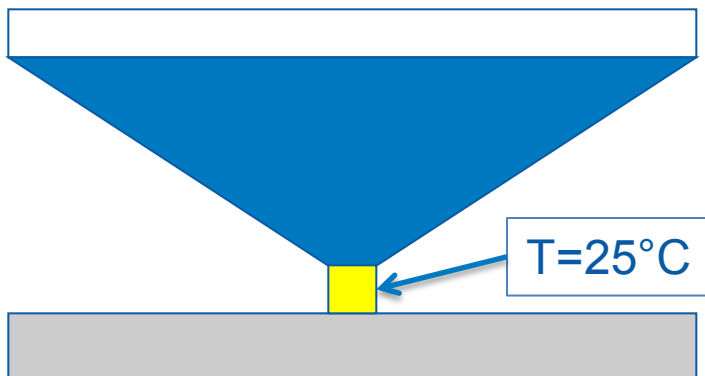
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March 1, 2012

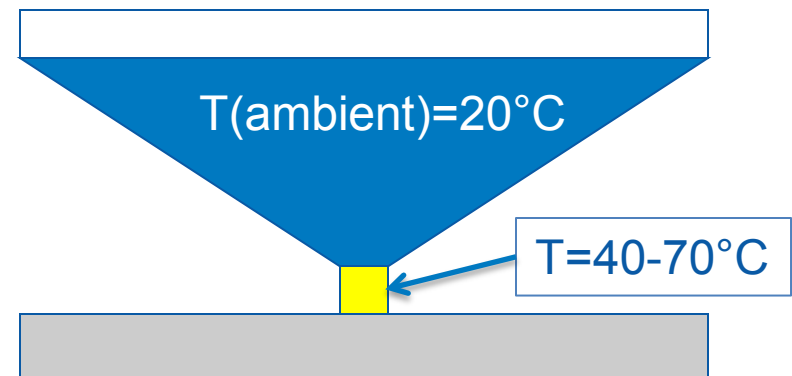
NREL/PR-5200-54566

Motivation for Creating Specification of Concentrator Cell Data Sheet

- Provide more consistency and complete info for customers wishing to compare cells
- Provide basis for defining temperature coefficients to be used for relating power rating under test conditions and operating conditions (cell $T = 25^{\circ}\text{C}$ vs ambient $T = 20^{\circ}\text{C}$)



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Status of Specification

- Is approved as new work item
- Draft will be discussed in April at WG7 meeting
- As technical specification, if approved by WG7 in April, it will be submitted and could be approved (go to print) as early as next fall.

Next slides show proposed specification

Product Identification

Manufacturer	The XYZ Company
Model Number	XX1090
Type of Cell	Three junction: GaInP(1.89 eV) /GaInAs (1.39 eV)/Ge (0.67 eV) on germanium substrate

Product Description

Cell Area	1.1 cm X 1.0 cm
Active area	1 cm X 1 cm (see sketch)
Simulator active area	1.01 cm ²
Nominal efficiency	39% ± 2%
Nominal current ratios	Ratio for 1.39 eV/1.89 eV = 1.0 ± 0.03 Ratio for 0.67 eV/1.89 eV = 1.7 ± 0.03
Temperature coefficients (measured at the irradiance for which the product was designed)	$\alpha = dI_{sc}/dT = + 0.11\% \pm 0.03\%/^{\circ} C$ when top-cell limited; $+0.07\% \pm 0.03\%/^{\circ} C$ when bottom-cell limited $\beta = dV_{oc}/dT = -0.15\% \pm 0.02\%/^{\circ} C$ $dP_{max}/dT = -0.24\% \pm 0.06\% ^{\circ} C$ Measured at 100 W/cm ² ; AM1.5 Direct; temperature range of 25° C to 70° C. Other conditions may also be documented.
Front metallization	Silver
Front metallization thickness	1 μm
Back metallization	Gold
Maximum current	1 A/cm ²
Anti-reflection coating design	Matched to index of 1.4

Cell processing and use conditions

Recommended operating temperature	$-20^{\circ} \text{ C} < T < 150^{\circ} \text{ C}$
Recommended processing temperature	$< 350^{\circ} \text{ C}$ for 10 min
Chemical compatibilities/ incompatibilities	?

Graphs/Tables

Typical I-V curve	Measured at 50 W/cm² ; AM1.5 Direct spectrum; 25° C. Isc, Imp, Vmp, Voc, FF, Efficiency specified
Efficiency as function of irradiance	Plotted/tabulated as function of irradiance for 25° C, 40° C, 60° C, and 80° C ; AM1.5 Direct spectrum
Voltage at maximum power point	Plotted/tabulated as function of irradiance for 25° C; AM1.5 Direct spectrum
Efficiency distribution for full-wafer production	Fraction of population in 0.25% efficiency bins using manufacturers choice of conditions; indicate number of cells measured
Quantum efficiency (preferably presented as both a graph and a table)	One curve for each junction, measured at 25° C
Angular responsivity	Isc as a function of incidence angle compared with cosine function

Cell testing and screening conditions

LIV test	Example conditions: 50 W/cm ² ; AM1.5D; 25° C; 100% of samples
Thermal cycling – IEEE 1513	< 10% loss in efficiency after 500 cycles from -40° C to +110° C

**Cell Datasheet description will provide
for more consistent and complete
characterization of concentrator cells**

**Please send your
questions, comments and
suggestions
by April 10, 2012
to:**

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