

Space standard: ESCC Basic Specification No. 22900

TOTAL DOSE STEADY-STATE IRRADIATION TEST METHOD		ATRON METROLOGY	
RADIATION SOURCE AND DOSIMETRY	COBALT 60 SOURCE	X rays radiation line equivalence	
		<p>The gamma-ray dose rate of a Cobalt 60 source shall be calibrated in accordance with the requirements of ESCC Basic Specification No. 21500 to 5% or better</p>	<ul style="list-style-type: none"> - Uniformity < 3 % at ± 15° at 1 m from target - Ionizing radiation emitted are measured with an uncertainty of ± 3.6% <p>Total X-rays dose rate: from 900 µrad(Si)/h to 90 krad(Si)/h (in nominal conditions)</p>
		Dosimetry shall be traceable to national standards	KERMA in air is used as reference quantity
	Corrections for source decay shall be made once per month	Not concerned	
	ELECTRON SOURCE (electrostatic electron accelerator)	Electron radiation line	
		<p>The electron energy shall be:</p> <ul style="list-style-type: none"> • sufficient to penetrate the package • ≥ 1 MeV at the semiconductor die 	from 0.2 to 3.5 MeV
		The electron source shall be a steady-state type	Stability: ± 350 eV (short term), ~ 0.1 % (long term)
		<p>The fluence for a given electron energy shall be accurately converted to Gy(Si) (and/or rad(Si)) at chip level, taking into account potential dose enhancement effects due to the component's package, high-Z materials, etc.</p>	<ul style="list-style-type: none"> - Electron beam current: from 1 pA (6.25x10⁶ e-/s) to 1 mA (6.25x10¹⁵ e-/s) - Electron range in silicium: From 400 µm to 7,5 mm <p>Total electron dose rate in a 1cm³ silicium sample: from 30 rad(Si)/h to 300 Grad(Si)/h</p>
The dose profile of the beam shall be uniform within ±10% for a distance of at least 24mm or 5 times the chip diagonal, whichever is the greater	Garanteed uniformity on a 240x40 mm ² area		

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RADIATION LEVELS	Letter	RHA Level (TID) rad(Si)	Corresponding Exposure Levels rad(Si)
	M	3k	1.5k / 3k / 4.5k
	D	10k	5k / 10k / 15k
	E	20k	10k / 20k / 30k
	P	30k	15k / 30k / 45k
	F	50k	25k / 50k / 75k
	R	100k	50k / 100k / 150k
	A	300k	150k / 300k / 450k
	G	500k	250k / 500k / 750k
H	1000k	500k / 1000k / 1500k	
RADIATION DOSE RATES	Window		Dose rate
	1 («Standard Rate»)		0.36 to 180 krad(Si)/h
	2 («Low Rate»)		36 to 360 rad(Si)/h
TEMPERATURE REQUIREMENTS	+20 ± 10°C which shall not vary by more than 3°C during the irradiation exposure.		Stability for the temperature at 19 ± 1°C and the humidity at 50 ± 10% inside the irradiation room
ELECTRICAL MEASUREMENT SYSTEMS TEST FIXTURES	The current as measured for the specified bias between any 2 terminals on each empty socket shall not exceed 10% of the lowest current value given in the specification of pre-irradiation values.		Supplier responsibility
TEST SET-UP AND SITE REQUIREMENTS	In-Situ Testing, Remote Testing, Bias Conditions		
TIME INTERVALS FOR MEASUREMENT	(a) The time interval from the completion of an exposure to the start of the measurement of parameters shall be a maximum of 1 hour. (b) The time interval from the completion of an exposure to the start of the next exposure shall be a maximum of 2 hours		