# TERMS, DEFINITIONS, ABBREVIATIONS,

# SYMBOLS AND UNITS FOR

# CHARGE COUPLED DEVICES

## ESCC Basic Specification No. 2139020


| | |
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## DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

| DCR No. | CHANGE DESCRIPTION |
|---|---|
| 799 | Specification upissued to incorporate editorial changes per DCR. |

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## 1 SCOPE

This specification forms part of ESCC Basic Specification No. 21300 and covers Charge Coupled Devices.

## 2 TERMS, DEFINITIONS AND SYMBOL LETTERS

| Symbol | Parameter |
|---|---|
| A | Pixel Area |
| $a_i$ | Photoresponse Non-Uniformity or Dark Signal Limit for Number of Photoresponse Non-Uniformity or Dark Signal Defects |
| $C_{\Phi L}$, $C_{\Phi M}$ $C_{\Phi P}$, $C_{\Phi R}$ | Electrode Capacitance (for Readout Register, Memory Zone, Image Zone and Reset respectively) |
| $C_{\Phi L_0}$, $C_{\Phi M_0}$ $C_{\Phi P_0}$, $C_{\Phi R_0}$ | Electrode Capacitance with Respect to Another Clock (for Readout Register, Memory Zone, Image Zone and Reset respectively) |
| CTE | Charge Transfer Efficiency |
| CTF | Contrast Transfer Function |
| CTI | Charge Transfer Inefficiency |
| CVF | Charge to Voltage Conversion Factor |
| DSNU | Dark Signal Non-Uniformity |
| $\Delta U_{Ref}$ | Reference Voltage Error Band |
| $\Delta U_{Signal}$ | Signal Voltage Error Band |
| E | Exposure |
| $EB_1$ | Reference Level Error Band |
| $EB_2$ | Signal Level Error Band |
| $\varepsilon$ | Charge Transfer Inefficiency for One Stage |
| FI | Image Zone to Memory Zone and Memory Zone to Output Register Frequency |
| FL | Output Register and Reset Frequency |
| $\Phi_L$ | Readout Register Clock |
| $\Phi_M$ | Memory Zone Clock |
| $\Phi_P$ | Image Zone Clock |
| $\Phi_{PS}$ | Photosite to Shift Register Transfer Clock |
| $\Phi_R$ | Reset Clock |
| $\Phi_T$ | Transport Clock |
| HCTE | Horizontal Charge Transfer Efficiency |
| HCTI | Horizontal Charge Transfer Inefficiency |
| $I_{DD}$ | Power Supply Current |
| $I_E$ | Insulation Leakage Current Between Pins (Input Current) |
| $I_H$ | Internal Driver Supply Current |
| $I_L$ | Leakage Current on Input Gates |
| $I_{RD}$ | Signal Current in Reset Bias Electrode |
| L | Length of Image Plane |

| Symbol | Parameter |
|---|---|
| $\lambda$ | Wavelength |
| LE | Linearity Error |
| MTF | Modulation Transfer Function |
| $Ndef_i$ | Number of Photoresponse Non-Uniformity or Dark Signal Defects Beyond $a_i$ Limit |
| NS | Total Smearing Factor |
| P | Flatness of Image Area |
| $\rho$ | Pixel Pitch |
| PRNU | Photoresponse Non-Uniformity |
| QE | Quantum Efficiency |
| R | Responsitivity |
| $R(B_i)$ | Spectral Responsitivity in Optical Band $B_i$ |
| SPRNU | Spectral Photoresponse Non-Uniformity |
| $TD_i$ | Timing Diagram i |
| $t_{D\text{-}Reset}$ | Reset Level Setting Time |
| $t_{D\text{-}Signal}$ | Signal Level Setting Time |
| $t_f$ | Fall Time |
| $t_h$ | High Level Time |
| Ti | Integration/ Exposure Time |
| TILT | Parallelism between Image Plane and window |
| $t_l$ | Low Level Time |
| $T_{op}$ | Operating Temperature |
| $t_r$ | Rise Time |
| $T_{ref}$ | Reference Temperature |
| TRIG | Signal for Acquisition Start |
| $T_{sol}$ | Soldering Temperature |
| $T_{stg}$ | Storage Temperature Range |
| $T_t$ | Duration of Vertical Transfer Period |
| $t_{U\text{-}Ref}$ | Reference Level Duration |
| $t_{U\text{-}Signal}$ | Signal Level Duration |
| $\tau_c$ | Capture Time Constant or Trapping State in a CCD Buried Channel |
| $\tau_e$ | Emission Time Constant of Trapping State in a CCD Buried Channel |
| $\Theta$ | Image Plane Orientation (Skew) |
| $V_a$ | Average Output Signal under Illumination |
| $V_{ANTIBLOOMING}$ | Antiblooming Voltage |
| VCTE | Vertical Charge Transfer Efficiency |
| VCTI | Vertical Charge Transfer Inefficiency |
| $V_{DD}$ | Output Amplifier Drain Supply |
| $V_{DS}$ | Average Dark Signal |
| $V_{GS}$ | Register Output Gate Bias |

| Symbol | Parameter |
|---|---|
| $V_{INVERSION}$ | Inversion Voltage |
| $V_N$ | Temporal RMS Noise in Darkness |
| $V_{OFFSET}$ | Offset Voltage |
| $V_{OS}$ | Video Output Signal |
| $V_r$ | Reference Voltage for Modulation Calculation |
| $V_{RD}$ | Reset Bias |
| $V_{REF}$ | DC Output Level |
| $V_{RESET}$ | Amplitude of Reset Feedthrough |
| $V_S$ | Signal Voltage |
| $V_{SAT}$ | Saturation Output Voltage |
| $V_{SS}$ | Substrate Bias Voltage |
| $V_{Video}$ | Video Voltage |
| W | Width of Image Plane |
| WOC | Spectral Range for Optical Coating on Window |
| WT | Window Thickness |
| X | Position of First Pixel (Horizontal) |
| Y | Position of First Pixel (Vertical) |
| Z | Optical Distance between Image Plane and Window |
| $Z_S$ | Output Impedance |