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FAIRCHILD RESEARCH & DEVELOPMENT

LIST OF TECHNICAL REPORTS

May 1971

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239	Anodic Oxidation of Silicon for MOS Capacitors in Integrated Circuits	D. Pilling	12-23-65
240	The Development of a Kerr Effect Microscope for both the Observation of Ferromagnetic Domains and Plotting the M-H Loops of Small Area	A. Carlson W. Carter	1-6-66
241	Thermal Switchback in High f_t Epitaxial Transistors	W. Steffe J. LeGall	2-4-66
242	Surface Effects on P-N Junctions: Characteristics of Surface Space-Charge Regions	A. Grove D. Fitzgerald	1-13-66
243	The Cooperative Diffusion Effect	J. Lawrence	2-18-66
244	Properties of the Silicon-Dioxide-Silicon System	B. Deal E. Snow A. Grove	2/16/66
245	Improving Yield of Integrated Arrays via Redundancy	J. Angell	3/30/66
246	MOS Characteristics for Gallium Arsenide	A. Grove E. Snow	4/7/66
247	The Doping of Epitaxial Silicon Films	W. Shepherd	4/13/66
248	The Investigation of Arsenic Trioxide as a Diffusion Source	R. Berry	4/28/66
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250	Barrier Energies in Metal-Silicon Dioxide-Silicon Structures	B. Deal E. Snow	4/29/66
251	Design Specifications for Nichrome Thin Film Resistors	K. Gohring	8/3/66
252	Gunn Diode Device Calculations	R. Solomon	6/3/66
253	Solute Diffusion in Disordered Silicon	J. Lawrence	6/15/66
254	Autodoping in Epitaxial Reactors. I. Arsenic	W. Shepherd	7/12/66
255	The Effect of a Parasitic Series Resistance on the Performance of Bulk Negative Conductivity Amplifiers	H. Kroemer	7/18/66
256	Oscilloscope C-V Plotter	C. Wagner	8/3/66

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257	Effect of Surface Fields on the Breakdown Voltage of Planar Silicon P-N Junctions	A. Grove O. Leistiko W. Hooper	7/22/66
258	Influence of Surface Conditions on Silicon Planar Transistor Current Gain	G. Reddi	7/25/66
259	Tolansky Interferometer Jig	S. Uyeda	8/4/66
260	Temperature Dependence of the MOS Transistor Characteristics Below Saturation	L. Vadasz A. Grove	8/5/66
261	Characteristics of the Surface-State Charge (Q_{SS}) of Thermally Oxidized Silicon	B. Deal M. Sklar A. Grove E. Snow	8/11/66
262	The Design of Arbitrary Length Counters Using Integrated, Sequential Majority-Logic Networks	J. Price	8/10/66
263	Operation of PN Junction Photodetectors in a Photon Flux Integration Mode	G. Weckler	8/19/66
264	Control of Q_o (Mobile Impurity Ion Charge) and Q_{SS} (Surface-State Charge) During Processing of MOS Devices	B. Deal	8/23/66
*265	Application of the Calcium Fluoride Lifting Technique to Planar Structures	W. Lehrer	8/25/66
266	Effect of Defects and Process Abnormalities on FT-1312	J. Lawrence	9/7/66
267	Operation of High Speed CTL in Transmission Line Environments	A. Lambert	9/8/66
*268	Life Time Control by Gold-Doping in Dielectrically Isolated, DTuL 969 Integrated Circuits	B. Frescura	9/27/66
*269	An Evaluation of the Dielectric Isolation Techniques for Linear Integrated Circuits	B. Frescura J. Barrett	9/27/66
*270	Summary of Processes for Fabricating Dielectrically Isolated Integrated Circuits	B. Frescura	10/14/66
271	Lifting and Undercutting of Photo Resist on Oxidized and Phosphorus Doped Silicon Wafers	A. Engvall	1/24/67
272	Tunnel Currents in SiO_2 Films	E. Snow	11/4/66
273	Majority Carrier Surface Mobilities in Thermally Oxidized Silicon	G. Reddi	10/15/66

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275	The T-5B Package	E. Kanazawa	11/28/66
276	Fused Glass Films on Silicon Devices	M. Dumesnil	1/15/67
277	Enhanced X-Ray Diffraction from Substrate Crystals Containing Discontinuous Surface Films	I. Blech E. Meieran	12/9/66
278	A Simple Model for the Spectral Response of Silicon Planar Photodiodes	R. Dyck	1/3/67
279	Reduction of Surface Recombination Velocity in an n-p-n Transistor	D. Fitzgerald A. Grove	12/23/66
280	The Average Grain Size During Normal Grain Growth in Polycrystalline Solids	M. Mendelson	1/12/67
281	Evidences Relating to Two Mechanisms of Substitutional Diffusion in Silicon	R. Ghoshtagore	1/16/67
282	Effects of Ionizing Radiation on Oxidized Silicon Surfaces and Planar Devices	E. Snow A. Grove D. Fitzgerald	1/24/67
283	Detailed Theory of the Negative Conductance of Bulk Negative Mobility Amplifiers, in the Limit of Zero Ion Density	H. Kroemer	2/10/67
284	Properties of Silicon Nitride Films on Silicon	B. Deal P. Fleming	2/10/67
285	Charge Migration on Oxidized Silicon Surfaces and Its Effect on p-n Junction Characteristics	E. Snow	2/15/67
286	A Punch-Through, Microwave, Negative-Resistance Diode	H. Ruegg	2/17/67
287	Program for Processing High Strength Beryllium Oxide Ceramics	M. Mendelson	5/11/67
288	Crystallographic Orientation Dependence of Scribing for Maximum Dice Yields	E. Meieran	3/27/67
289	Gettering Mechanisms - A Literature Study	J. Lawrence	3/1/67
290	The Thermal Expansion and Elasticity of Solder Glasses Containing a Dispersed Crystalline Phase	J. Rushton	3/1/67
291	Output Conductance of MOST's	P. Hower	8/8/67

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293	Base Design and Analysis for Silicon Transistors	D. Duncan	4/15/67
294	Stacking Fault Contrast in X-Ray Topographs of Annealed Si Web Dendrite	E. Meieran I. Blech	3/22/67
295	Evaluation of Glass Films Deposited by Electron-Beam Evaporation for Use as Crossover Insulation on Integrated Circuits	R. Dorilag N. Gault F. Rosengarten	4/28/67
296	Surface Recombination in Semiconductors	D. Fitzgerald A. Grove	4/25/67
297	Properties of Gold Doped MOS Structures	S. Cagnina E. Snow	5/16/67
298	Current Gain and Cutoff Frequency Falloff at High Currents	R. Whittier D. Tremere	6/14/67
299	MOS Device Characterization	D. Frohman L. Vadasz	5/31/67
300	Determination of Epitaxial Layer Thickness and Resistivity Required for High V_{CE0} NPN Transistor	F. Jones	7/21/67
301	Surface Effects on Low Frequency Noise: Initial Experimental Results	S. Hsu D. Fitzgerald	7/31/67
302	Silicon-Chromium Electron-Beam Deposited Resistive Films	R. Waits	7/31/67
303	Metallographic Analysis of Gettered Silicon	J. Lawrence	8/9/67
304	Process Effects on Fast Surface States of Thermally Oxidized Silicon I. Annealing at Temperatures of 920°C or Below	P. Castro B. Deal	8/17/67
305	Ultrasonic Flip-Chip Bonding	T. Asai	8/31/67
306	Electrical Properties of Vapor Deposited Silicon Nitride and Silicon Oxide Films on Silicon	B. Deal P. Fleming P. Castro	9/5/67
307	Evaluation of Bulk and Epitaxial GaAs by Means of X-Ray Topography	E. Meieran	11/9/67
308	Polarization Effects in Insulating Films on Silicon - A Review	E. Snow B. Deal	10/23/67

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310	A Regenerative Sense Amplifier for Thin Film Memory Applications	J. Newman	11/1/67
311	Scribing Methods and Yields Using GaAs Wafers	N. Pearson W. Lafky	10/27/67
312	Use of Beryllium Metallization on Silicon Devices as a Possible Replacement of Aluminum	A. Lewis	11/11/67
*313	The Vitrox Process: Fairchild #10 and #74 Glass Synthesis, Comminution and Fusion on Silicon Devices	M. Dumesnil R. Hewitt	10/10/67
314	Investigation of Diode Degradation in Glass Diode Packages	C. Fender A. Lewis	11/21/67
315	Precision Sputtered Tantalum Resistors	R. Martin	11/21/67
316	Metal-Semiconductor Ohmic Contacts	A. Lewis	12/11/67
317	Source-Controlled Modes of Operation of Surface Field-Effect Transistor	G. Parker	1/11/68
318	Deposition and Properties of RF Supttered Quartz	R. Martin	11/28/67
319	Sam Multi-Chip Package Development	T. Asai J. Schmidt	12/15/67
320	Transverse Negative Differential Mobilities for Hot Electrons and Domain Formation in Germanium	M. Shyam H. Kroemer	1/11/68
321	Laser-Adjustment of SiCr Thin Films Resistors	R. Waits	1/18/68
322	An Evaluation of Solutions Used to Clean Silicon Wafers	J. Lawrence B. Johnston	12/27/67
323	The Average Grain Size in Polycrystalline Ceramics	M. Mendelson	1/5/68
324	Computation of JFET dc Characteristics Before and After Fast-Neutron Irradiation	A. Molozzi D. Fitzgerald	1/12/68
325	Cristobalite: Its Cause and Prevention	J. Lawrence	1/22/68
326	Surface Effects on Metal-Silicon Contacts	A. Yu E. Snow	1/24/68
327	On Dislocations in Silicon Semiconductor Devices	J. Lawrence	1/22/68

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328	Cancelled		
329	CTuL Printed Circuit Board	R. Rice	1/68
330	Design of MOS Dynamic Logic Circuits	J. Downey	2/2/68
331	Preliminary Investigation of Nickel Gettering	P. Castro	2/6/68
332	Photoresist Exposure Control System	H. Murphy	2/1/68
333	Fundamentals of Physical Sputtering - Technology and Applications	N. Laegreid	2/12/68
334	Technology and Performance of Integrated Complementary MOS Circuits	T. Klein	3/8/68
335	The Effect of Illumination on Gunn Oscillations in Epitaxial GaAs	W. Haydl R. Solomon	3/15/68
336	Cancelled		
337	FD-6 Reliability Improvement	R. Rusert	6/12/68
338	Forward Current-Voltage and Switching Characteristics of P+n+ (Epitaxial) Diodes	R. W. Dutton R. J. Whittier	4/5/68
339	Electrical Properties of Vapox and Vapox/Thermox Films on Silicon	B. Deal	4/2/68
340	Solder Glasses: A Study and Comparison of Some Package-Related Properties	E. Kanazawa	5/10/68
341	Ultra Purification of SiCl ₄ by Fractional Crystallization	W. Kohler	4/26/68
342	Design of Schottky Barrier Diode Transistors	R. A. Aldrich	5/20/68
343	A Method of Determining Sodium Content of Semiconductor Processing Materials	B. Yurash B. Deal	5/16/68
344	Printed Circuit Semiconductor Test Probe	F. Green W. Lafky	6/3/68
345	Epitaxial Films Evaluation	E. Yim	8/26/68
346	Distillation of Arsenous Chloride Part 2	R. Kouyoumdjian	6/10/68
347	Effect of Cleaning and Drying Procedures on MOS Stability	M. Sklar B. Deal	6/24/68

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349	Microphoto Mask Making - Present and Future	S. Fok	8/12/68
350	Sputtered Silicon-Chromium Resistive Films	R. Waits	7/1/68
351	Enhanced Gold Solubility Effect in Heavily n-Type Silicon	S. Cagnina	7/17/68
352	Minority Carrier Injection of Metal-Silicon Contacts	A. Yu E. Snow	7/19/68
353	Silane Priming for the Prevention of KMER and KFTR Lifting on Oxide and Nitride Surfaces	A. Engvall	8/13/68
354	Advances in Doped Oxides as Diffusion Sources	M. Barry P. Olofsen	8/13/68
355	Electromigration in Thin Al Films	I. Blech E. Meieran	8/19/68
356	Cancelled		
357	Combinatorial Decoding of Semiconductor Memory Arrays	F. Greene	9/6/68
358	On Oxygen in Silicon: A Preliminary Study	J. Lawrence	11/27/68
359	Computer Aided Design and Characterization of Digital MOS Integrated Circuits	D. Frohman	10/11/68
360	Fowler-Nordheim Tunneling Into Thermally Grown SiO ₂	M. Lenzlinger	9/9/68
361	Electrical Evaluation of Epitaxial Layers of Silicon	M. Shyam	9/23/68
362	New Process Design Considerations - Control Emitter Push Effect and Bulk Contamination	J. Lawrence	1/16/69
363	An Experimental Study of Nickel and Phosphorus Gettering	L. J. Kabe11 W. Kauffman	10/9/68
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365	Anomalous Link Current	D. Forsythe	11/1/68
366	A Brief Study of Semiconductor Device Noise	N. Puckett	11/20/68
367	Properties of Phosphovapox Part I: Deposition and Structural Properties	M. Barry	11/11/68

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369	Properties of Phosphovapox Part III: Electrical Properties	M. Sklar B. Deal	12/6/68
370	Properties of Phosphovapox Part IV: Secondary Dielectrics as Barriers Against High Concentrations of Sodium Ions	M. Sklar	6/3/69
371	Stresses in Thin Films of Aluminum	P. Castro J. Campbell	11/8/68
372	Silane Primers for AZ-111 and AZ-1350H on Oxide and Nitride Surfaces	A. Engvall	10/31/68
373	Electroplating the New Generation of Microelectronic Devices	E. Duffek	11/8/68
374	Characteristics of Burst Noise of Silicon Devices	S. T. Hsu	11/21/68
375	Phosphorus and Arsenic Doping of Epitaxial Silicon Films in the 1000° to 1200°C Temperature Range	T. Swanson R. Tucker	11/22/68
376	Design of a Two-Phase Dynamic Shift Register	G. Masters	12/9/68
377	Doped Oxides as Diffusion Sources: I. Boron into Silicon	M. Barry P. Olofsen	12/5/68
378	Characteristics of Fast Surface States Associated with SiO ₂ and Si ₃ N ₄ -SiO ₂ -Si Structures	B. Deal E. MacKenna P. Castro	12/13/68
379	The Relationship Between Fast Surface States and Stress in Si ₃ N ₄ /SiO ₂ /Si Structures	E. MacKenna B. Deal	12/23/68
380	Fine Line Patterning of Metallized Ceramics	E. Duffek	1/31/69
381	Pyrolytic Deposition of Silicon Nitride and Silicon in a Resistance Heated Reactor	W. Kohler	1/10/69
382	Ohmic Contacts and Integrated Circuits	H. Sello	2/10/69
383	Introduction to Noise in Semiconductor Devices	A. Grove S. T. Hsu	1/10/69

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385	Some Recent Developments in Fused Glass Films on Semiconductor Devices	M. Dumesnil B. Hewitt	1/14/69
386	The Possibility of Producing a Thin Film Read Head for a Disc File	W. Carter	2/7/69
387	Charge Transport and Storage in Metal-Nitride-Oxide-Silicon (MNOS) Structures	D. Frohman-Bentchkowsky/ M. Lenziinger	2/12/69
388	Electrical Measurement of Inversion Layer Length	B. Jones	2/5/69
389	Vapor Phase Silane Priming for Prevention of Resist Lifting	A. Engvall	2/10/69
390	Electron Tunneling and Contact Resistance of Metal-Silicon Contact Barriers	A. Yu	3/10/69
391	Correlation of Diffusion Process Variations with Variations in Electrical Parameters of Bipolar Transistors	R. Berry	2/24/69
392	An Analysis of the Thermal Resistance of the Flip-Chip Structure - A Preliminary Report	S. Cagnina	3/3/69
393	High-Resistivity Thin-Film Resistors for Monolithic Circuits - A Review	B. Waits	3/4/69
394	LSI Bipolar Memory for Symbol II	F. Greene	3/20/69
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396	Elimination of Pattern Shift in Epitaxial Grown Silicon Films Using the Silicon Tetrachloride Process and <100> Oriented Silicon Substrates	W. Kohler	3/24/69
397	Avalanche Degradation of h_{FE} (This report has the same title as TM 443 also by B. McDonald)	B. McDonald	4/1/69
398	Epoxy Resins for Semiconductor Devices	R. Olberg E. Martich	4/1/69

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400	The Application of X-Ray Topographical Techniques to the Study of Semiconductor Crystals and Devices	E. Meieran	4/15/69
401	Integration of Metal-Nitride-Oxide-Semiconductor (MNOS) Transistors for Non-Volatile Storage Arrays	D. Frohman-Bentchkowsky	4/16/69
402	DIED AZ-1350H Resist Process (Used Mainly for 2-Layer Interconnection Dielectric Masking)	G. McNeil	4/21/69
403	Temperature Dependence of h_{FE} - Effects of Space Charge Recombination	P. Downing	4/25/69
404	VHF Noise Due to Surface States in MOS Devices	B. Jones R. Hurlston	5/6/69
405	Characteristics of Aluminum-Silicon Schottky Barrier Diode	A. Yu C. Mead	5/15/69
406	Hall Effect in Silicon-Chromium Films	M. Lenzlinger G. O'Keefe	5/16/69
407	The Impact of Technological Change in Communications on our R&D Effort in New Microwave Sources	F. Ivanek	5/23/69
408	Silicon Gate Technology	F. Faggin	6/16/69
409	The Effects of Lateral Injection and Base-Widening on the High Current-Low Voltage Characteristics of Transistors	R. Whittier	5/23/69
410	Some Observations Regarding the Relationship Between Bulk Dislocation and Gettering in Silicon	P. Castro	6/3/69
411	Avalanche-Induced 1/f Noise in Bipolar Transistors	B. McDonald	6/11/69
412	Reverse Osmosis - The Easy Way to Purify Water for the Microelectronics and Related Industries?	A. Mills	6/18/69
413	Masking of Sodium by Silicon Nitride Films at 550°C	V. Rodriguez E. MacKenna M. Sklar	6/20/69

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415	Investigation of Spiral Inductors as a Tuning Element for Integrated Circuit Applications	W. Carter	7/22/69
416	Radiation Effects on Silicon Schottky Barriers	A. Yu	7/3/69
417	Photosensor Arrays for Machine Readers	R. Dyck	7/8/69
418	Surface State Related 1/f Noise in p-n Junctions	S. T. Hsu	7/10/69
419	Photochemical Smog as a Cause of Resist Scum	A. Engvall	7/14/69
420	Gunn Effect Oscillator - A Study in Device Design	M. Shyam	7/22/69
421	Degradation in GaAs Electroluminescent Diodes	Prof. R. Bube	7/31/69
422	Interim Report: Boro-Phosphovapox Diffusion Sources for Transistor Fabrication	J. F. Podell	8/5/69
423	Ionic Contamination Induced Degradation of Low Current h_{FE}	B. McDonald	8/15/69
424	Low Field Transport Properties of Electrons and Holes in GaAs	M. Shyam	8/15/69
425	Phototransistor Photoresponse (BETA) Uniformity Studies	W. Lafky J. Lincoln	9/30/69
426	Laser of SiCr Thin-Film Resistors	P. Fehlhaber	8/25/69
427	Aluminum-n-Type Silicon Schottky Barrier	A.Y.C. Yu	9/8/69
428	High Yield Two-Layer Metal Array Processing	G. McNeil	9/22/69
429	Avalanche Injection and Second Breakdown in Transistors	P. Hower	9/19/69
430	An Investigation of Lateral Transistors I. DC Characteristics	S. Chou	10/6/69

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433	Advances in Microwave Transistor Technology	J. Archer	10/22/69
434	A Semi-Open-Tube Diffusion into Gallium Arsenide	D. Tremere	10/24/69
435	Silicon Nitride Induced Plastic Deformation and Stress in Silicon	E. MacKenna	11/10/69
436	A Continuous Process for the Deposition of Silicon Oxide from the Oxidation of Silane	M. Barry	11/4/69
437	Physical Model for Burst Noise in Semiconductor Devices	S. T. Hsu R. J. Whittier C. A. Mead (Calif. Inst of Tech.)	11/10/69
438	Silicon Nitride. Part I - Physical Properties	V. Rodriguez E. MacKenna P. Fleming	11/14/69
439	The Metal-Nitride-Oxide-Silicon (MNOS) Transistor--Characteristics and Applications	D. Frohman-Bentchkowsky	11/24/69
440	The Metal-Semiconductor Contact - An Old Device with a Promising Future	A. Yu	11/17/69
441	Stability of Photoresponse of Diode Arrays	R. Dyck	11/20/69
442	Computer Simulation of the Transient Response of MOS Integrated Circuits	S. Townsend	12/12/69
443	A Preliminary Study of the Technology for Gold Doping of Silicon Devices	P. Downing	11/28/69
444	Silicon Nitride - Part II: Electrical Properties	V. Rodriguez E. MacKenna P. Fleming	12/15/69
445	Preliminary Evaluation of SF ₆ as a Gaseous Etchant for Silicon in the Temperature Range of 1040° to 1100°C	E. MacKenna P. Kodama	12/8/69
446	On the Measurement of Recombination Currents in Epitaxial Base Transistors	S. Chou	12/12/69
447	New Technology Developed for the T0-601 MOS Cascode	R. E. Hurlston	12/12/69

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448	Analysis of Silicon Nitride Layers on Backscattering and Channeling Effect Measurements **Calif. Inst. of Technology	V. Rodriguez J. Gyulai** O. Meyer** J. W. Mayer**	12/15/69
449	The Si ₃ N ₄ -SiO ₂ Interface Charge in MNOS Structures	V. Rodriguez D. Frohman-Bentchkowsky P. J. Fleming	12/19/69
450	Low-Frequency Excess Noise in Metal-Silicon Schottky Barrier Diodes	S. T. Hsu	12/17/69
451	Aluminum Properties as Affected by Evaporation Conditions	J. F. Campbell	1/12/70
452	Calculation of Evaporated Metal Profiles over Steps	J. F. Campbell	1/19/70
453	Use of the Ellipsometer for Optical Constant and Thin Film Measurements	J. Campbell	1/22/70
454	The Use of Polycrystalline Silicon in the Fabrication of Low Breakdown Voltage Diodes	J. Manoliu	1/30/70
455	Effect of a "J" Process Glass Located at the SiO ₂ -Si ₃ N ₄ Interface on the C-V Characteristics of MNOS Capacitors	E. L. MacKenna P. Kodama	2/5/70
456	Gate Protection of MIS Devices	M. Lenzlinger	1/26/70
457	Heat Transfer Characteristics of Silicon Die Flip-Chip and Conventionally Mounted on Ceramic Substrates	S. F. Cagnina	5/7/70
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459	Hall Mobility in Chemically Deposited Polycrystalline Silicon	T. I. Kamins	3/25/70
460	Measurement and Control of Q ₀ and Q _{SS} During Processing of Thermally Oxidized Silicon Devices	B. Deal M. Sklar	4/7/70
461	Doped Oxides as Diffusion Sources: II Phosphorus into Silicon	M. L. Barry	5/20/70
462	Surface State Related 1/f Noise in MOS Transistors	S. T. Hsu	5/21/70
463	CW Operation of LSA Oscillators in R-Band	M. Shyam	4/10/70

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465	Polycrystalline Silicon: Preliminary Discussion of Deposition & Properties	T. Kamins	5/1/70
466	Molybdenum Silicide Thin-Film Resistors	R. Waits P. Fehlhaber E. Orris	4/20/70
467	Degradation of h_{FE} at Moderate Current Levels	B. A. McDonald	5/19/70
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