

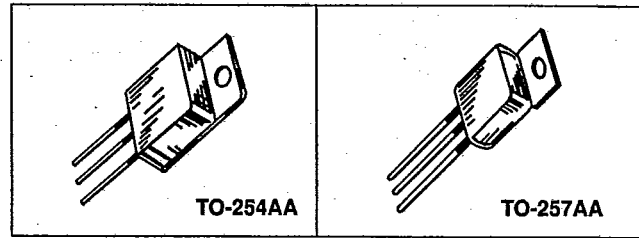
T-91-60

MIL-Processed Semiconductors (Continued)

SELECTOR GUIDE  
POWER TRANSISTORS

TMOS FETs

These TMOS Power FETs are designed for high speed power switching applications such as switching regulators, converters, solenoid and relay drivers, and PWM motor controls.



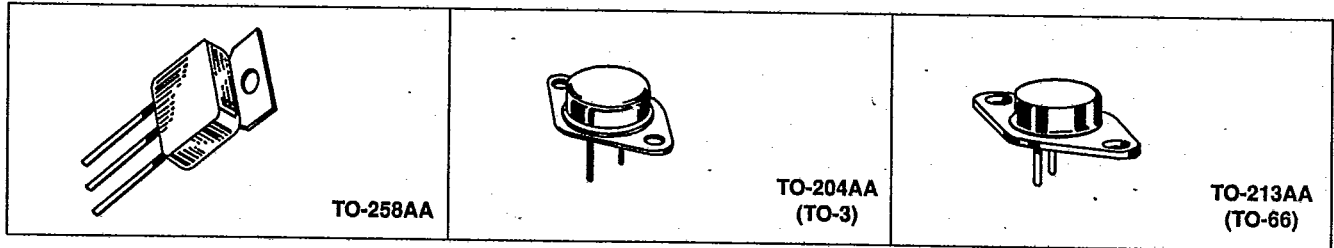
Device Number	Maximum Ratings			Electrical Characteristics					
	V <sub>DSS</sub> Vdc	I <sub>D</sub> A	P <sub>D</sub> W	I <sub>DSS</sub> mA Max	r <sub>DS(On)</sub> Ohms @ Max	I <sub>D</sub> Adc	V <sub>GS(th)</sub> Vdc Min/Max	t <sub>d(on)</sub> ns Max	t <sub>d(off)</sub> ns Max
<b>TO-254AA Package</b>									
<b>N-Channel</b>									
MHM5N100HX, HXV	1000	5	125	0.2	3	2.5	2/4.5	40	160
MHM12N50HX, HXV	500	12	125	0.2	0.4	7	2/4.5	40	150
MHM25N20HX, HXV	200	25	125	0.2	0.1	12.5	2-Feb	40	150
MHM25N10HX, HXV	100	25	125	0.2	0.065	20	2-Feb	40	150
<b>P-Channel</b>									
MHM8P20HX, HXV	200	8	125	0.2	0.75	4	2/4.5	40	100
<b>TO-257AA Package</b>									
<b>N-Channel</b>									
MHT1N100HX, HXV	1000	1	75	0.2	10	0.5	2/4.5	50	200
MHT4N50HX, HXV	500	4	75	0.2	1.5	2	2/2.5	50	200
MHT8N20HX, HXV	200	8	75	0.2	0.4	4	2/4.5	40	200
<b>P-Channel</b>									
MHT2P50HX, HXV	500	2	75	0.2	6	1	2/4.5	50	150
MHT8P20HX, HXV	200	8	125	0.2	0.7	4	2/4.5	40	100
<b>TO-258AA Package</b>									
<b>N-Channel</b>									
MHR5N100HX, HXV	1000	5	125	0.2	3	2.5	2/4.5	40	160
MHR15N50HX, HXV	500	15	125	0.2	0.4	7	2/4.5	40	150
MHR30N20HX, HXV	200	30	125	0.2	0.1	16	2-Feb	40	150
MHR35N10HX, HXV	100	35	125	0.2	0.065	20	2-Feb	40	150
<b>P-Channel</b>									
MHR8P20HX, HXV	200	8	125	0.2	0.75	4	2/4.5	40	100

\* has current sensing-capability

NOTE: All TMOS devices are presently on engineering hold pending requalification of the new die. Check with your local sales office for delivery.

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Power Transistors (Continued)



Bipolar, Low Frequency

Device Number	Maximum Ratings			Electrical Characteristics					
	V <sub>CEO</sub> Adc	I <sub>C</sub> Adc	P <sub>D</sub> W	h <sub>FE</sub> Min/Max	@ I <sub>C</sub> mA	t <sub>r</sub> /t <sub>f</sub> μs Max	@ I <sub>C</sub> Adc	V <sub>CE(sat)</sub> Vdc Max	f <sub>T</sub> MHz Min
<b>TO-204AA/AE Package</b>									
<b>NPN</b>									
MJ10016HX, HXV	120	30	200	200/—	30	—	—	4	—
MJ11022HX, HXV	250	15	175	400/15000	10000	1.2/10	10	2	3
MJ11032HX, HXV	120	50	300	400/—	50	—	—	3.5	—
MJ12005HX, HXV	750	8	100	Not Specified		—/1	5	5	—
<b>PNP</b>									
MJ11021HX, HXV	250	15	175	400/15000	10000	1.2/10	10	2	3
MJ11033HX, HXV	120	50	300	400/—	50	—	—	3.5	—
<b>TO-213AA Package</b>									
<b>NPN</b>									
MJ6316HX, HXV	80	7	90	20/100	2.5	0.7/0.8	2.5	1	4
<b>PNP</b>									
MJ6318HX, HXV	80	7	90	20/100	2.5	0.7/0.8	2.5	1	4
<b>TO-254AA Package</b>									
<b>NPN</b>									
<b>t<sub>on</sub>/t<sub>off</sub></b>									
MJM3716H, HX, HXV	80	10	150	50/150	1000	—/2	—	1	—
MJM5339H, HX, HXV	100	5	40	60/240	2000	0.1/0.2	0.5	0.7	30
MJM6059H, HX, HXV	100	12	150	1000/18000	6000	2/10	5	2	—
MJM6341H, HX, HXV	150	25	200	30/120	10000	—/—	—	1	40

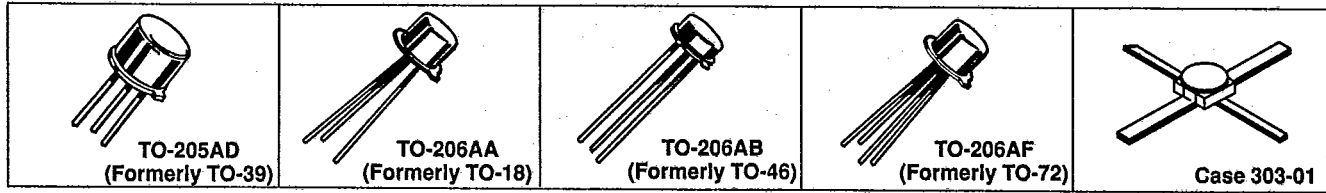
Bipolar, RF

Device Number	Maximum Ratings			Electrical Characteristics					
	V <sub>CEO</sub> Vdc	I <sub>C</sub> mA	P <sub>D</sub> W	h <sub>FE</sub> Min/Max	P <sub>out</sub> W Min	& GPE dB Min	@ f MHz	Coll. Eff. % Min	@ f MHz
<b>TO-257AA Package</b>									
<b>NPN</b>									
MJT5339H, HX, HXV	100	5	40	60/240	2000	0.1/0.2	0.5	0.7	30
<b>PNP</b>									
MJT6193H, HX, HXV	100	5	40	60/120	2000	0.1/0.2	0.5	0.7	30

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MIL-Processed Semiconductors (Continued)

SMALL-SIGNAL TRANSISTORS



Bipolar, General Purpose

Device Number	Max Ratings		Electrical Characteristics							
	V <sub>CEO</sub> Volts	I <sub>C</sub> mA	h <sub>FE</sub> @ I <sub>C</sub> Min/Max   mA	V <sub>CE(sat)</sub> Volts @ I <sub>C</sub> /I <sub>B</sub> Max   mA	t <sub>r</sub> */t <sub>f</sub> * t <sub>on</sub> /t <sub>off</sub> ns @ I <sub>C</sub> /I <sub>B</sub> Max   mA	h <sub>FE</sub> @ f Min/Max   kHz				
<b>TO-206AA Package</b>										
<b>NPN</b>										
MM2896HX, HXV	90	1000	60/200	150	0.6	150/15	—	—	50/275	1
MM3227H, HX	20	200	100/300	10	0.2	10/1	23-Dec	10/3	—	—
<b>PNP</b>										
MM3497HX, HXV	120	100	40/—	10	0.35	29-Sep	300/1000	10/1	40/300	1
<b>TO-205AD Package</b>										
<b>NPN</b>										
MM5682HX, HXV	120	1000	40/150	250	0.6	250/25	—	40/—	1	
MM5681HX, HXV	100	1000	40/150	250	0.6	250/25	—	—	40/—	1
MM4239HX, HXV	80	3000	30/150	250	0.3	500/50	—	—	30/—	1
<b>PNP</b>										
MM5680HX, HXV	120	1000	40/150	250	0.6	250/25	—	—	40/—	1
MM4236HX, HXV	80	1000	30/150	250	0.6	1k/125	—	—	25/—	1

Bipolar, RF

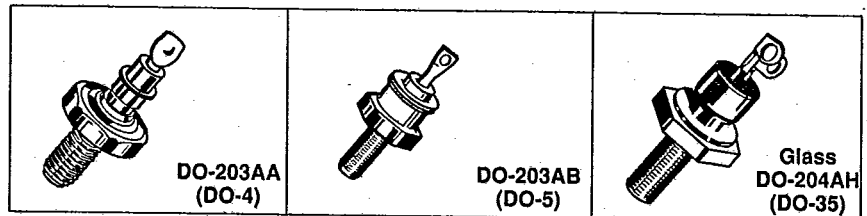
Device Number	Maximum Ratings			Electrical Characteristics								Package
	V <sub>CEO</sub> Vdc	I <sub>C</sub> mA	P <sub>D</sub> W	I <sub>CBO</sub> μA dc Max	h <sub>FE</sub> Min/Max	f <sub>T</sub> GHz @ I <sub>C</sub> Min   mA	NF dB @ f Max   MHz	G <sub>PE</sub> dB @ f Min   MHz				
<b>NPN</b>												
MRF544HX, HXV*	70	400	3.5	20	15/—	1	50	—	—	—	—	TO-205AD
MRF6804HXV	15	50	0.5	0.05	30/200	—	—	3	1000	15	1000	CASE 303-01
MRF904HX, HXV	15	30	0.2	0.05	30/200	—	—	2	450	—	—	TO-206AF
MRF5031HX, HXV	10	20	0.2	0.01	25/300	1	5	2.5	450	14	450	TO-206AF
MRF5836HX, HXV	10	200	—	10	25/—	2	50	—	—	—	—	TO-206AB
MRF544AHX, HXV*	100*	400	3.5	20	15/—	1	50	—	—	—	—	TO-205AB

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**Bipolar, RF (Continued)**

Device Number	Maximum Ratings			Electrical Characteristics								Package
	V <sub>CEO</sub> Vdc	I <sub>C</sub> mA	P <sub>D</sub> W	I <sub>CBO</sub> $\mu$ Adc Max	h <sub>FE</sub> Min/Max	f <sub>T</sub> GHz @ I <sub>C</sub> Min   mA	NF dB @ f Max   MHz	G <sub>PE</sub> dB @ f Min   MHz				
<b>PNP</b>												
MRF522HX,HXV	10	50	—	10	25/125	—	0	3.5	1000	10	1000	CASE 303-01
MRF545HX,HXV	70	400	3.5	20	15/—	1	50	—	—	—	—	TO-205AD
MRF4957H,HX,HXV	30	30	0.2	0.1	30/165	1.2	2(I <sub>E</sub> )	3.5	450	17	450	TO-206AF
MRF5160HX,HXV	40	400	5	1	10/—	0.5	50	—	—	8	400	TO-205AD
MRF5583HX,HXV	30	500	5	0.05	25/100	1	40	—	—	—	—	TO-205AD
MRF6985HX,HXV	30	16	270	1500	20/100	—	—	—	—	8	400	—
MRF6986HX,HXV	30	16	270	1500	20/100	—	—	—	—	7.5	500	—
MRF545AHX,HXV	100*	400	3.5	20	15/—	1	50	—	—	—	—	TO-205AD

\*V<sub>CER</sub>



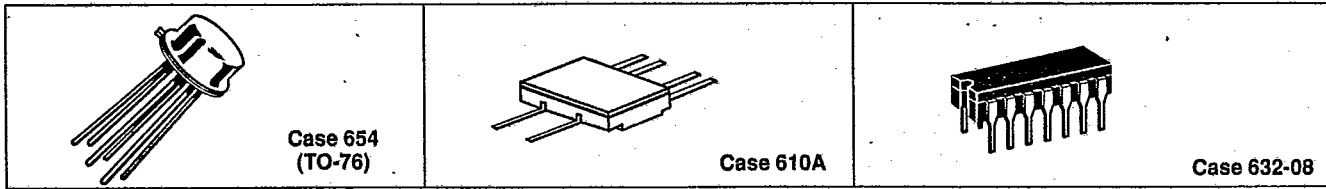
**RECTIFIERS** — All are available with HX and HXV classifications.

Device Number	Maximum Rating			Electrical Characteristics						Package
	I <sub>O</sub> Amps	V <sub>RRM</sub> Volts	I <sub>FSM</sub> Amps	V <sub>F</sub> Volts @ I <sub>F</sub> Max   Amps	I <sub>R</sub> A @ V <sub>R</sub> Max   Volts	t <sub>rr</sub> $\mu$ s @ I <sub>F</sub> Max   Amps				
<b>Fast Recovery</b>										
MR836HX,HXV	3	600	100	1.1	3	500	600	0.2	1	CASE 60-01
MR3910HX,HXV	30	100	300	1.4	30	25	100	0.2	1	DO-203AB
MR3911HX,HXV		200	300	1.4	30	25	200	0.2	1	
MR3913HX,HXV		400	300	1.4	30	25	400	0.2	1	
<b>Ultrafast Recovery</b>										
MUR2515HX,HXV	25	150	500	0.95*	25*	10	150	0.05	1	DO-203AA
MUR5010HX,HXV	50	100	600	1.15	50	10	100	0.05	1	DO-203AB
MUR5020HX,HXV	50	200	600	1.15	50	10	200	0.05	1	DO-203AB
<b>Schottky</b>										
MBR030HX,HXV	0.5	30	15	0.5*	0.1*	1*	30*	—	—	DO-204AH
MBR040HX,HXV	0.5	40	15	0.5*	0.1*	1*	40*	—	—	DO-204AH
MBR5825HX,HXV	15	40	500	0.38	5	10000	40	—	—	CASE 60-01
MBR6391HX,HXV	35	45	600	0.68*	50*	1500*	45*	—	—	DO-203AA
MBR6392HX,HXV	60	45	800	0.78*	65*	70*	45*	—	—	DO-203AB

\* = Instantaneous Values, e.g. v<sub>F(pk)</sub> @ i<sub>F(pk)</sub> and i<sub>R(pk)</sub> @ v<sub>R(pk)</sub>

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MIL-Processed Semiconductors (Continued)



**MULTIPLE TRANSISTORS**

**Bipolar**

Multiple transistors are multi-chip devices with two (duals) or four (quads) chips in a single package. The transistors are signal devices intended for switching and amplifier applications.

Device Number	Maximum Ratings			Electrical Characteristics						Package
	V <sub>CEO</sub> Vdc	I <sub>C</sub> mA	P <sub>D</sub> * W	I <sub>CBO</sub> μAdc Max	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> mA	V <sub>CE(sat)</sub> Volts @ Max	I <sub>C</sub> & mA	I <sub>B</sub> mA	
<b>DUALS — NPN</b>										
MD2219AFHX, HXV	50	800	0.0046	0.01	100/300	150	0.3	150	15	610A
MD2369AHX, HXV	15	200	0.36	0.02	40/120	10	0.02	10	1	654
MD2369AFHX, HXV	15	200	0.36	0.02	40/120	10	0.02	10	1	610A
MD3735HX, HXV	40	1500	0.65	0.25	40/140	500	0.5	500	50	654
MD3735FHX, HXV	40	1500	0.4	0.25	40/140	500	0.5	500	50	610
MD918HX, HXV	15	50	0.2	0.01	20/200	3	0.4	10	1	654
MD918FHX, HXV	15	50	0.2	0.01	20/200	3	0.4	10	1	610A
<b>DUALS — PNP</b>										
MD2905AFHX, HXV	60	600	0.6	0.01	100/300	150	0.4	150	15	610A
MD3251AHX, HXV	60	50	0.625	0.02	100/300	10	0.25	10	1	654
MD3251AFHX, HXV	60	50	0.4	0.02	100/300	10	0.25	10	1	610A
MD3468HX, HXV	50	1000	0.65	0.1	25/75	500	0.3	150	15	654
MD3468FHX, HXV	50	1000	0.4	0.1	25/75	500	0.3	150	15	610
MD3799FHX, HXV	60	50	0.4	0.01	300/900	0.5	0.25	1	0.1	654
MD4261HX, HXV	15	30	0.3	—	30/150	10	0.35	10	1	654
MD4261FHX, HXV	15	30	0.3	—	30/150	10	0.35	10	1	610
<b>DUALS — NPN/PNP</b>										
MD6002HX, HXV	30	500	0.625	0.02	100/300	150	0.4	150	15	654
MD6002FHX, HXV	30	500	0.625	0.02	100/300	150	0.4	150	15	610
<b>QUADS — NPN</b>										
MHQ2484HX, HXV	60	50	2	0.005	200/500	0.01	0.3	1	0.1	632
MQ2484HX, HXV	60	50	0.6	0.005	200/500	0.01	0.3	1	0.1	607
MHQ3735HX, HXV	40	1500	2	0.25	40/140	500	0.3	150	15	632
MQ3735HX, HXV	40	1500	0.6	0.25	40/140	500	0.3	150	15	607
MHQ2369HX, HXV	15	500	1.5	0.2	40/120	10	0.2	10	1	632
MQ2369AHX, HXV	15	500	0.6	0.2	40/120	10	0.2	10	1	607
MHQ918HX, HXV	15	50	1.6	0.01	20/200	3	0.4	10	1	632
MQ918HX, HXV	15	50	0.4	0.01	20/200	3	0.4	10	1	607

\* All di's, equal power

(continued)

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## Bipolar (Continued)

Device Number	Maximum Ratings			Electrical Characteristics						Package
	V <sub>CEO</sub> Vdc	I <sub>C</sub> mA	P <sub>D</sub> * W	I <sub>CBO</sub> μA dc Max	h <sub>FE</sub> @ I <sub>C</sub> mA Min/Max	V <sub>CE(sat)</sub> Volts Max @ I <sub>C</sub> mA & I <sub>B</sub> mA				
<b>QUADS-PNP</b>										
MHQ3251AHX, HXV	60	200	1.5	0.02	100/300	10	0.25	10	1	632
MQ3251AHX, HXV	60	200	0.6	0.02	100/300	10	0.25	10	1	607
MHQ3799HX, HXV	60	50	1.5	0.01	300/900	0.5	0.25	1	0.1	632
MQ3799HX, HXV	60	50	0.6	0.01	300/900	0.5	0.25	1	0.1	607
MHQ3468HX, HXV	50	1000	2	0.1	25/75	500	0.35	150	15	632
MQ3468HX, HXV	50	1000	0.6	0.1	25/75	500	0.35	150	15	607
MHQ4261HX, HXV	15	30	0.8	—	30/150	10	0.15	1	0.1	632
MQ4261HX, HXV	15	30	0.4	—	30/150	10	0.15	1	0.1	607
<b>QUADS-NPN/PNP</b>										
MHQ6002HX, HXV	30	500	1.9	0.02	100/300	150	0.4	150	15	632
MQ6002HX, HXV	30	500	0.6	0.02	100/300	150	0.4	150	15	607

\* All die, equal power

## THYRISTORS — SCRs

Device Number	V <sub>DRM</sub> V Max	I <sub>T(RMS)</sub> A Max	I <sub>DRM</sub> μA	V <sub>TM</sub> V Max	I <sub>GT</sub> μA Max	V <sub>GT</sub> V Max	I <sub>H</sub> mA Max	T <sub>J</sub> °C Min/Max	Package
MCR2323H/AH	50								TO-205AD (TO-39)
MCR2324H/AH	100	1.6	10	1.5	200	0.8	2	-0.52	
MCR2326H/AH	200								
MCR2328H/AH	300								