



January 2015

KA78M05 / LM78M05 / MC78M05

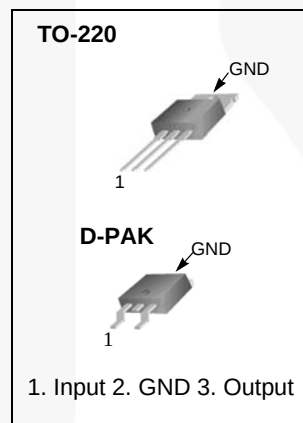
3-Terminal 0.5 A Positive Voltage Regulator

Features

- Output Current up to 0.5 A
- Output Voltages of 5 V
- Thermal Overload Protection
- Short-Circuit Protection
- Output Transistor Safe Operating Area (SOA) Protection

Description

The KA78M05 / LM78M05 / MC78M05 series of three-terminal positive regulators is available in the TO-220 / D-PAK packages, making it useful in a wide range of applications.

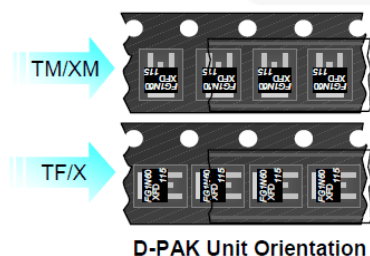


Ordering Information⁽¹⁾

Product Number	Package	Packing Method	Operating Temperature
KA78M05TU	TO-220 (Dual Gauge)	Rail	-40 to +125°C
KA78M05RTM	D-PAK	Tape and Reel	
MC78M05CDTX			
LM78M05CT	TO-220 (Single Gauge)	Rail	

Note:

1. Refer to below figure for TM / TF suffix of DPAK packing option.



KA78M05 / LM78M05 / MC78M05 — 3-Terminal 0.5 A Positive Voltage Regulator

Block Diagram

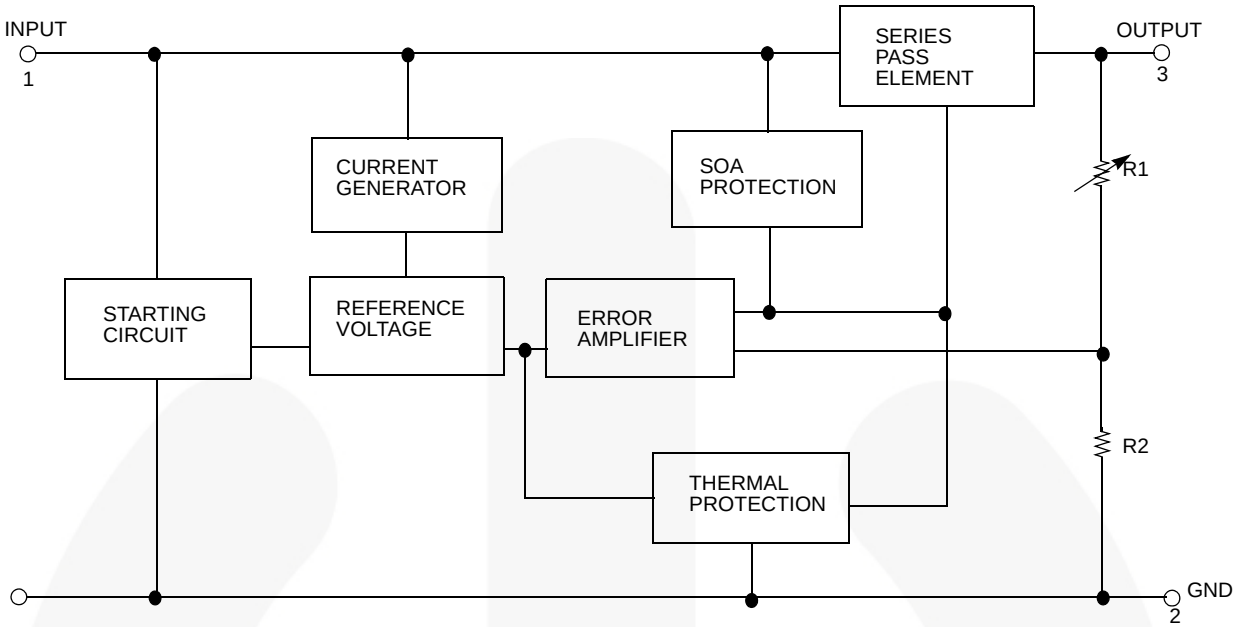


Figure 1. Block Diagram

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Value	Unit
V_I	Input Voltage (for $V_O = 5\text{ V}$)		35	V
$R_{\theta JC}$	Thermal Resistance, Junction-Case ⁽²⁾	TO-220 ($T_C = +25^\circ\text{C}$)	2.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-Air ^{(2), (3)}	TO-220 ($T_A = +25^\circ\text{C}$)	66	$^\circ\text{C/W}$
		D-PAK ($T_A = +25^\circ\text{C}$)	92	
T_{OPR}	Operating Junction Temperature Range		-40 to +125	$^\circ\text{C}$
$T_{J(MAX)}$	Maximum Junction Temperature Range		150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-65 to +150	$^\circ\text{C}$

Notes:

- Thermal resistance test board.
Size: 76.2 mm x 114.3 mm x 1.6 mm (1S0P)
JEDEC standard: JESD51-3, JESD51-7
- Assume no ambient airflow.

Electrical Characteristics

Refer to the test circuits, $-40 \leq T_J \leq +125^\circ\text{C}$, $I_O = 350\text{ mA}$, $V_I = 10\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified.⁽⁴⁾

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = +25^\circ\text{C}$	4.8	5.0	5.2	V
		$I_O = 5\text{ mA to }350\text{ mA}$, $V_I = 7\text{ V to }20\text{ V}$	4.75	5.00	5.25	
ΔV_O	Line Regulation ⁽⁵⁾	$I_O = 200\text{ mA}$ $T_J = +25^\circ\text{C}$			100	mV
		$V_I = 7\text{ V to }25\text{ V}$ $V_I = 8\text{ V to }25\text{ V}$			50	
ΔV_O	Load Regulation ⁽⁵⁾	$I_O = 5\text{ mA to }0.5\text{ A}$, $T_J = +25^\circ\text{C}$			100	mV
		$I_O = 5\text{ mA to }200\text{ mA}$, $T_J = +25^\circ\text{C}$			50	
I_Q	Quiescent Current	$T_J = +25^\circ\text{C}$		4.0	6.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 8\text{ V to }25\text{ V}$			0.8	
$\Delta V/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$ $T_J = -40\text{ to }+125^\circ\text{C}$		-0.5		mV/ $^\circ\text{C}$
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$		40		$\mu\text{V}/V_O$
RR	Ripple Rejection	$f = 120\text{ Hz}$, $I_O = 300\text{ mA}$ $V_I = 8\text{ V to }18\text{ V}$, $T_J = +25^\circ\text{C}$		80		dB
V_D	Dropout Voltage	$T_J = +25^\circ\text{C}$, $I_O = 500\text{ mA}$		2		V
I_{SC}	Short-Circuit Current	$T_J = +25^\circ\text{C}$, $V_I = 35\text{ V}$		300		mA
I_{PK}	Peak Current	$T_J = +25^\circ\text{C}$		700		mA

Notes:

- The parameters are guaranteed across the temperature range by characterization.
- Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Typical Applications^{(6), (7)}

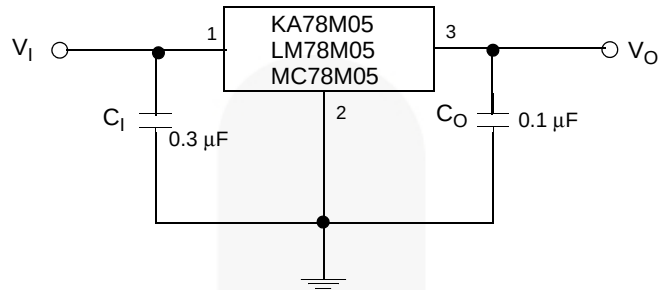


Figure 2. Fixed-Output Regulator

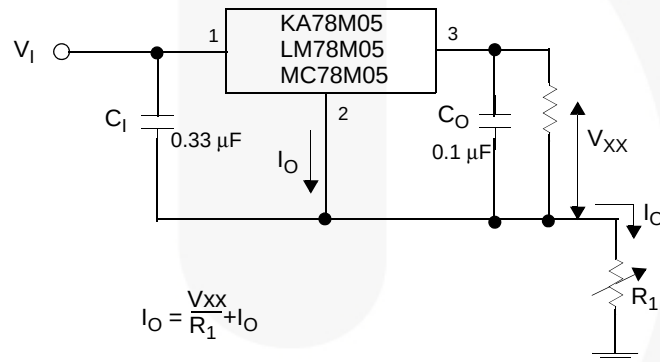


Figure 3. Constant-Current Regulator

Notes:

6. C_I is required if the regulator is located an appreciable distance from the power supply filter.
7. Although no output capacitor is needed for stability, it does improve transient response.

Typical Applications (Continued)

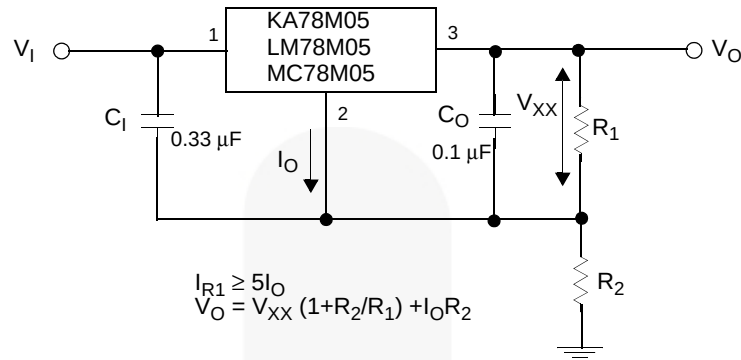


Figure 4. Circuit for Increasing Output Voltage

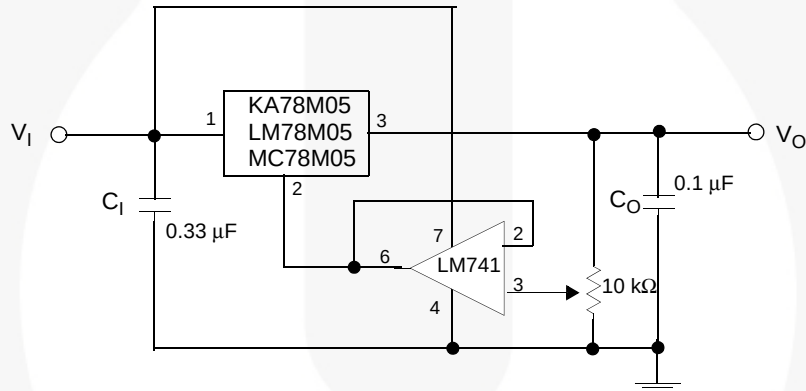


Figure 5. Adjustable Output Regulator (7 to 30 V)

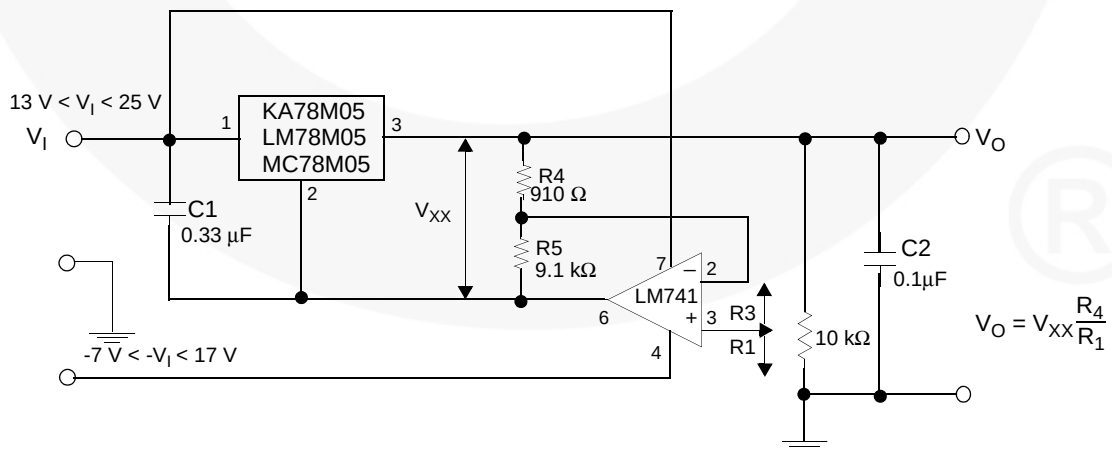


Figure 6. 0.5 to 10 V Regulator

Physical Dimensions

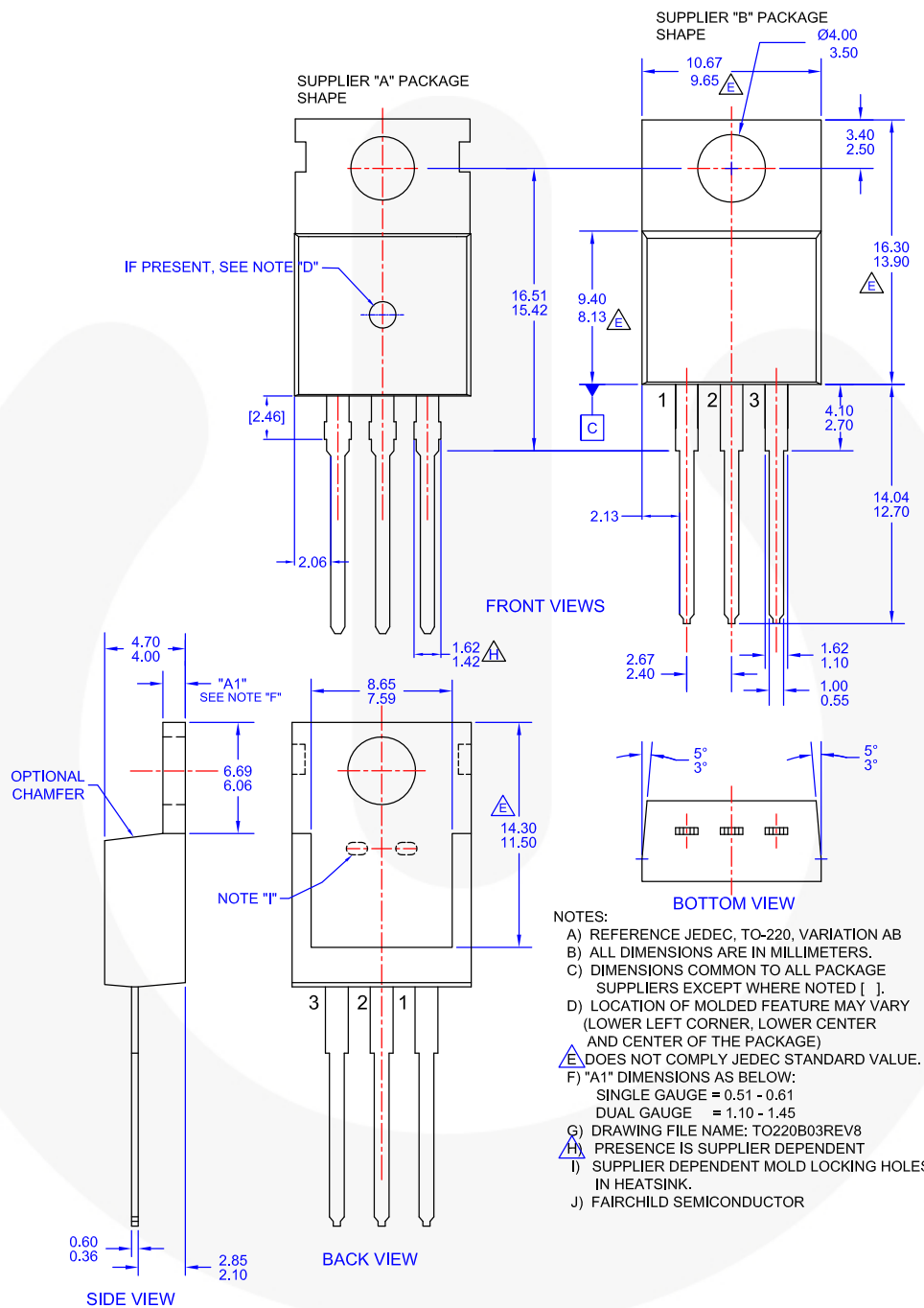


Figure 7. TO-220, MOLDED, 3LEAD, JEDEC VARIATION AB

Physical Dimensions (Continued)

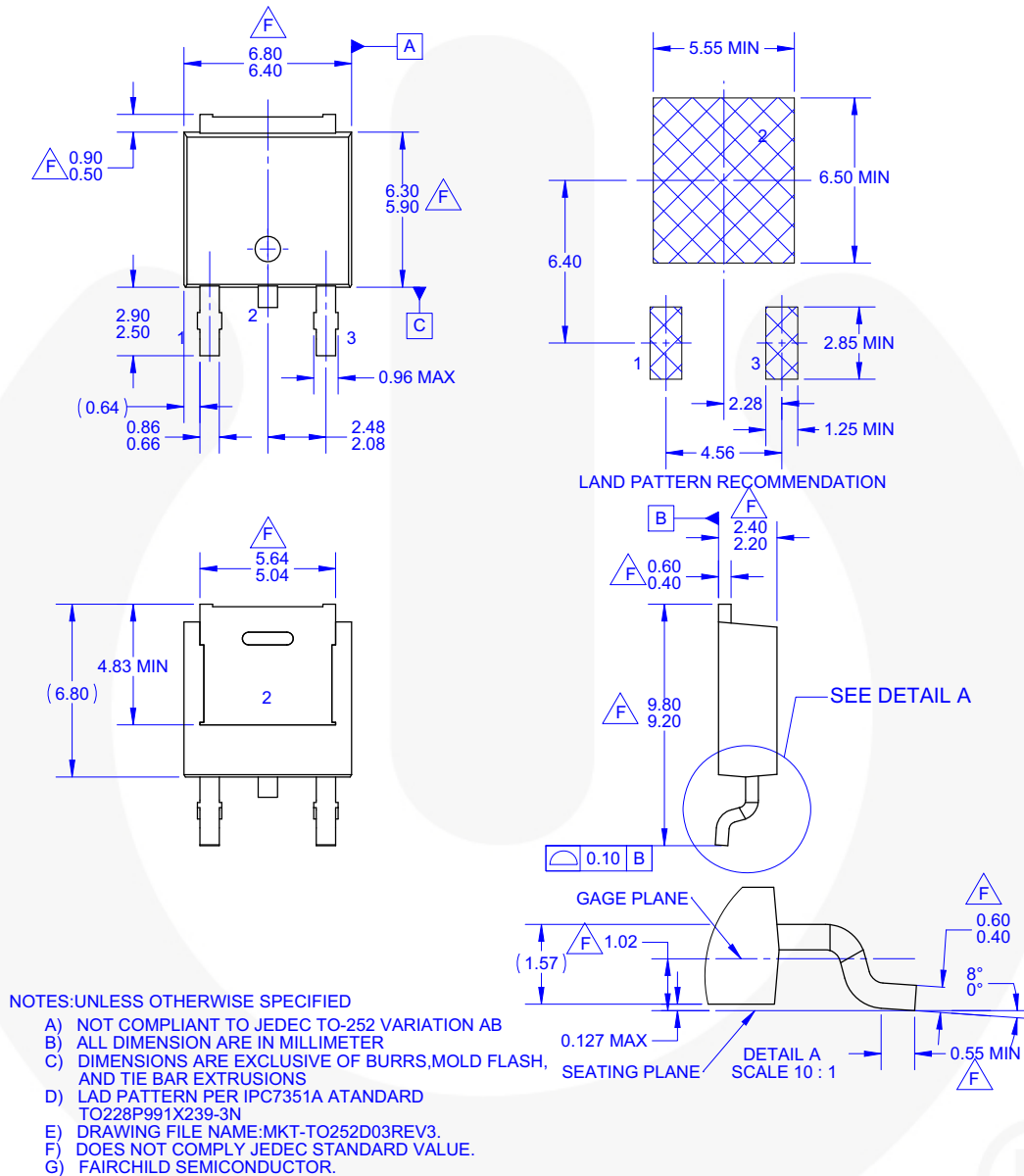


Figure 8. 3-LEAD, TO-252, JEDEC TO-252 VAR. AB, SURFACE MOUNT (DPAK)



TRADEMARKS

The following includes products registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™
AttitudeEngine™
Awinda®
AX-CAP®
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficientMax™
ESBC™
F®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™
FPS™

F-PFS™
FRFET®
Global Power ResourceSM
GreenBridge™
Green FPS™
Green FPS™ e-Series™
Gmax™
GTO™
IntelliMAX™
ISOPLANAR™
Making Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
MotionGrid®
MTi®
MTx®
MVN®
mWSaver®
OptoHiT™
OPTOLOGIC®

OPTOPLANAR®

PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™

Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™
Sync-Lock™

 SYSTEM GENERAL®
TinyBoost®
TinyBuck®
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TranSiC™
TriFault Detect™
TRUECURRENT®
µSerDes™
 SerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XS™
Xsens™
仙童™

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT <http://www.fairchildsemi.com>. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I73