

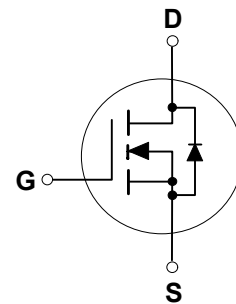
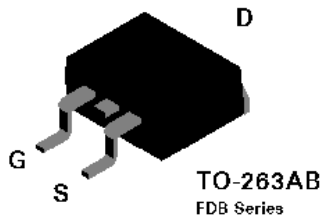
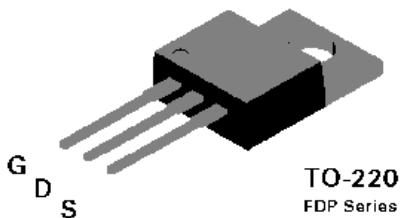
## FDP4030L / FDB4030L N-Channel Logic Level Enhancement Mode Field Effect Transistor

### General Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process has been especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as DC/DC converters and other battery powered circuits where fast switching, low in-line power loss, and resistance to transients are needed.

### Features

- 20 A, 30 V.  $R_{DS(ON)} = 0.035 \Omega @ V_{GS}=10 \text{ V}$   
 $R_{DS(ON)} = 0.055 \Omega @ V_{GS}=4.5 \text{ V}$ .
- Critical DC electrical parameters specified at elevated temperature.
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor.
- High density cell design for extremely low  $R_{DS(ON)}$ .
- 175°C maximum junction temperature rating.



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	FDP4030L	FDB4030L	Units
$V_{DSS}$	Drain-Source Voltage		30	V
$V_{GSS}$	Gate-Source Voltage		$\pm 20$	V
$I_D$	Drain Current - Continuous (Note 1)		20	A
	- Pulsed (Note 1)		60	
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$		37.5	W
	Derate above $25^\circ\text{C}$		0.25	
$T_J, T_{STG}$	Operating and Storage Temperature Range		-65 to 175	$^\circ\text{C}$
$T_L$	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		275	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		4	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		62.5	$^\circ\text{C/W}$

**Electrical Characteristics** ( $T_c = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>DRAIN-SOURCE AVALANCHE RATINGS</b> (Note 1)						
<b>OFF CHARACTERISTICS</b>						
$W_{DSS}$	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 15\text{ V}, I_D = 7\text{ A}$			50	mJ
$I_{AR}$	Maximum Drain-Source Avalanche Current				7	A
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		33		mV/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$ $T_J = 125^\circ\text{C}$			10	$\mu\text{A}$
					1	mA
$I_{GSSF}$	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate - Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
<b>ON CHARACTERISTICS</b> (Note 1)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	1.6	2	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		-4.1		mV/°C
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$ $T_J = 125^\circ\text{C}$		0.025	0.035	$\Omega$
				0.048	0.06	
				$V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$		0.046
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 10\text{ V}$	30			A
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$		11		S
<b>DYNAMIC CHARACTERISTICS</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		365		pF
$C_{oss}$	Output Capacitance			210		pF
$C_{rss}$	Reverse Transfer Capacitance			70		pF
<b>SWITCHING CHARACTERISTICS</b> (Note 1)						
$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = 15\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 10\text{ }\Omega$		8	15	nS
$t_r$	Turn - On Rise Time			8	15	nS
$t_{D(off)}$	Turn - Off Delay Time			20	40	nS
$t_f$	Turn - Off Fall Time			10	20	nS
$Q_g$	Total Gate Charge	$V_{DS} = 24\text{ V}$ $I_D = 10\text{ A}, V_{GS} = 10\text{ V}$		13	18	nC
$Q_{gs}$	Gate-Source Charge			2		nC
$Q_{gd}$	Gate-Drain Charge			4		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current				20	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current				60	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$ (Note 1) $T_J = 125^\circ\text{C}$		1.12	1.3	V
				1.08	1.2	

Note:

 1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

## Typical Electrical Characteristics

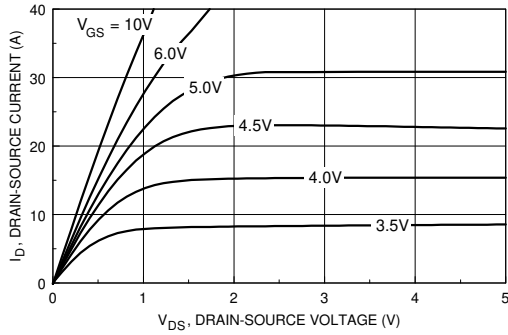


Figure 1. On-Region Characteristics.

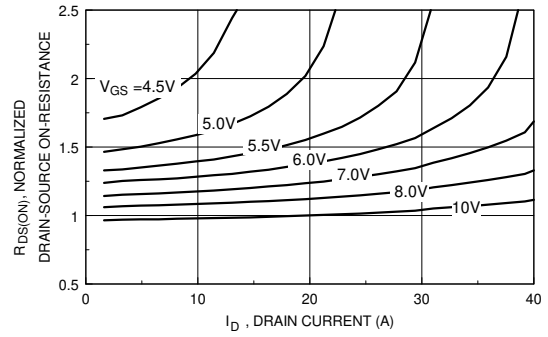


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

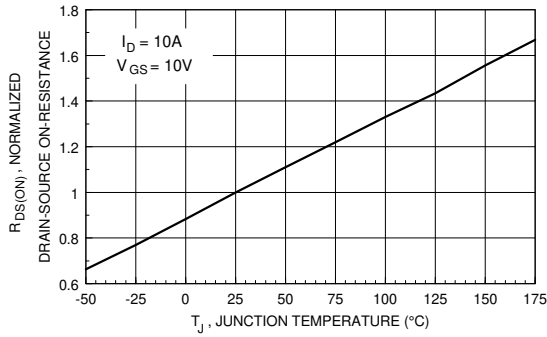


Figure 3. On-Resistance Variation with Temperature.

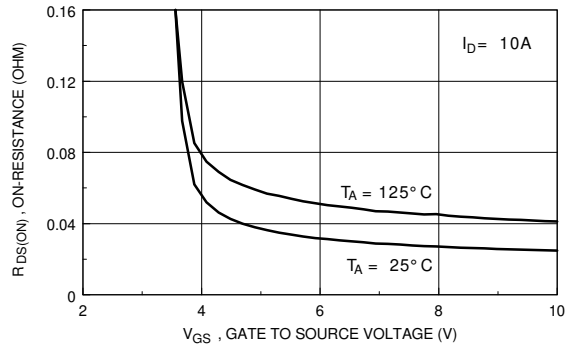


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

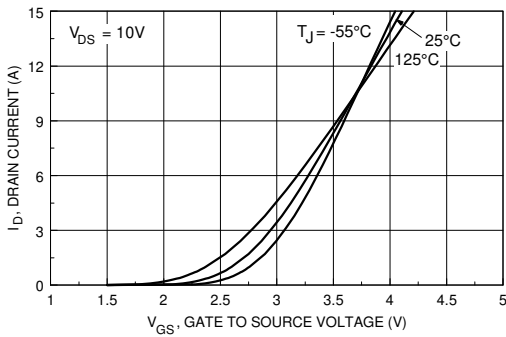


Figure 5. Transfer Characteristics.

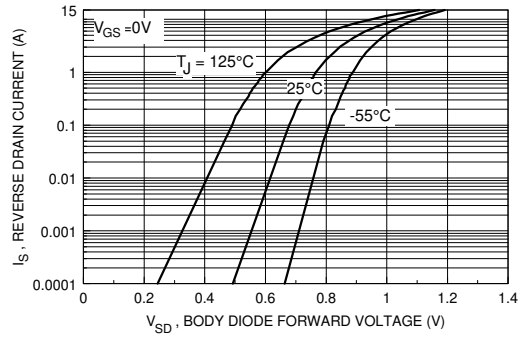


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

## Typical Electrical Characteristics (continued)

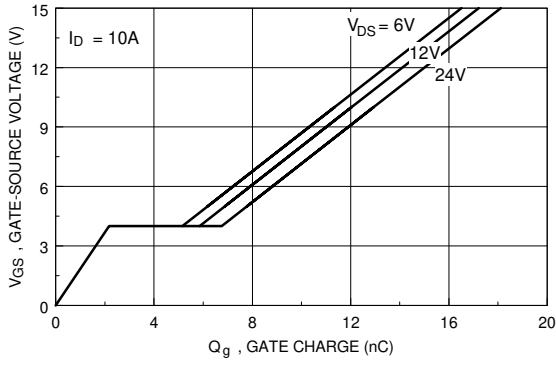


Figure 7. Gate Charge Characteristics.

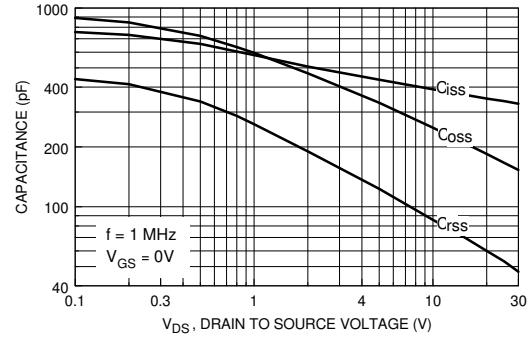


Figure 8. Capacitance Characteristics.

EFFECTIVE

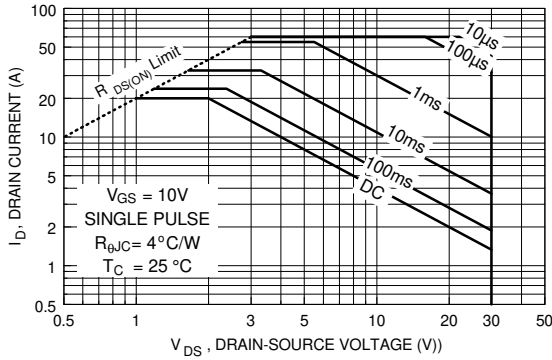


Figure 9. Maximum Safe Operating Area.

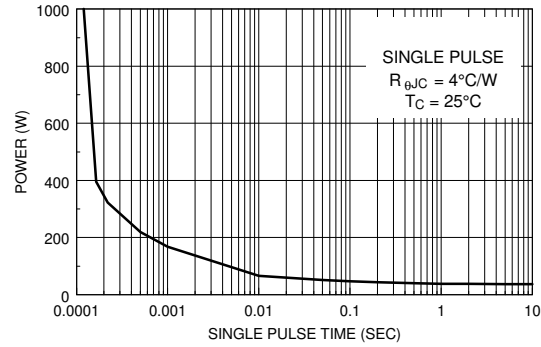


Figure 10. Single Pulse Maximum Power Dissipation.

NORMALIZED

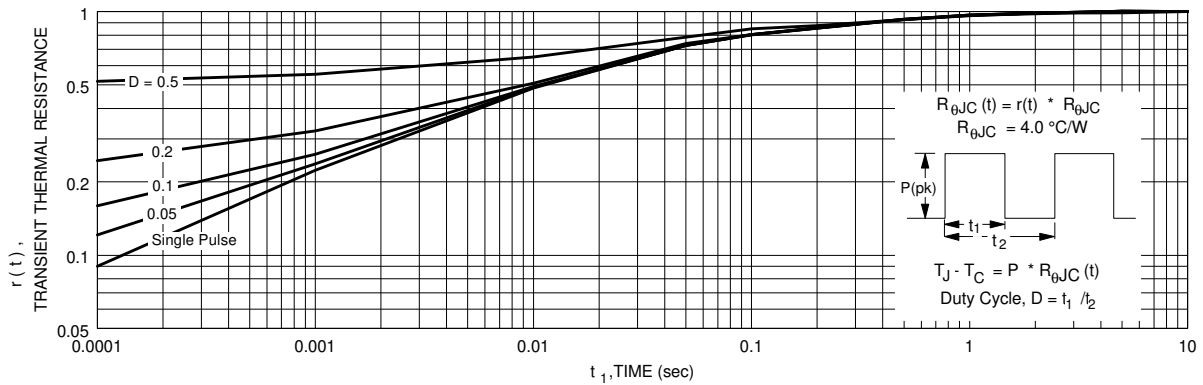
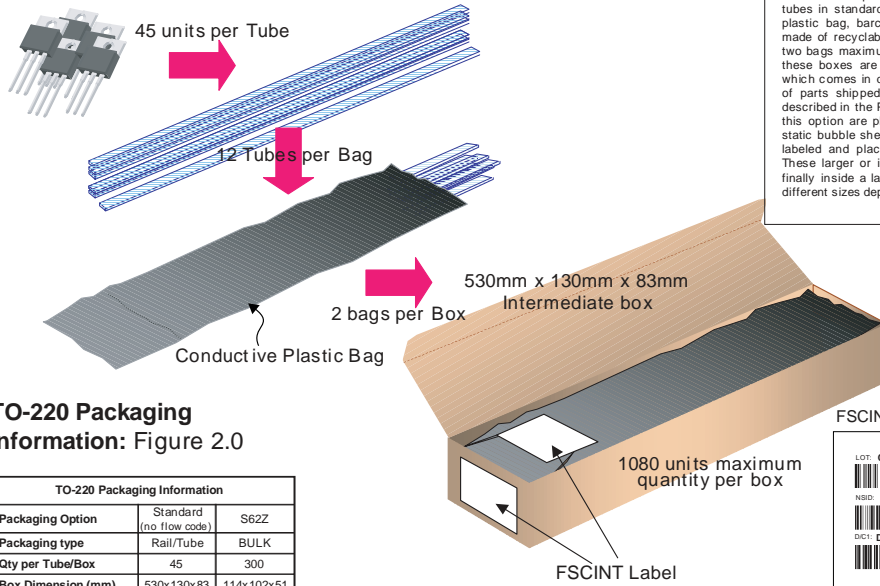


Figure 11. Transient Thermal Response Curve.

# TO-220 Tape and Reel Data and Package Dimensions



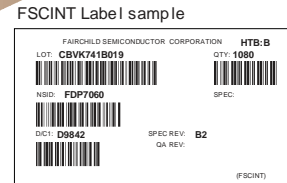
## TO-220 Tube Packing Configuration: Figure 1.0



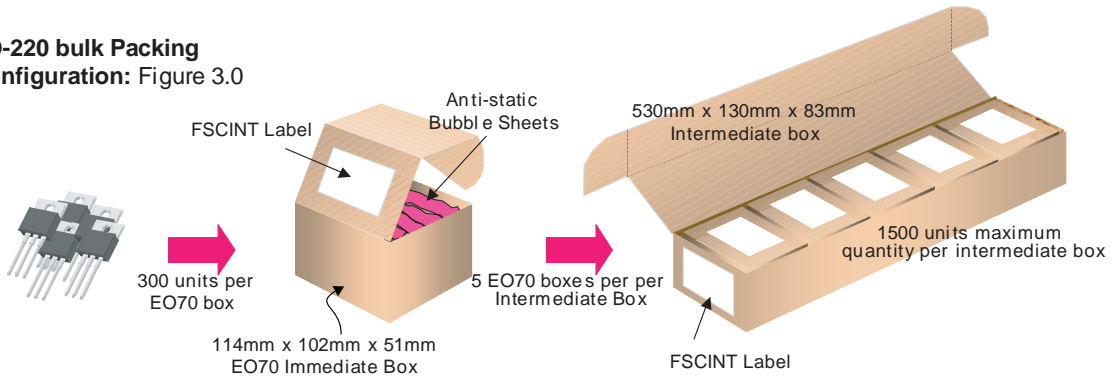
**Packaging Description:**  
 TO-220 parts are shipped normally in tube. The tube is made of PVC plastic treated with anti-static agent. These tubes in standard option are placed inside a dissipative plastic bag, barcode labeled, and placed inside a box made of recyclable corrugated paper. One box contains two bags maximum (see fig. 1.0). And one or several of these boxes are placed inside a labeled shipping box which comes in different sizes depending on the number of parts shipped. The other option comes in bulk as described in the Packaging Information table. The units in this option are placed inside a small box laid with anti-static bubble sheet. These smaller boxes are individually labeled and placed inside a larger box. (See fig. 3.0). These larger or intermediate boxes then will be placed finally inside a labeled shipping box which still comes in different sizes depending on the number of units shipped.

## TO-220 Packaging Information: Figure 2.0

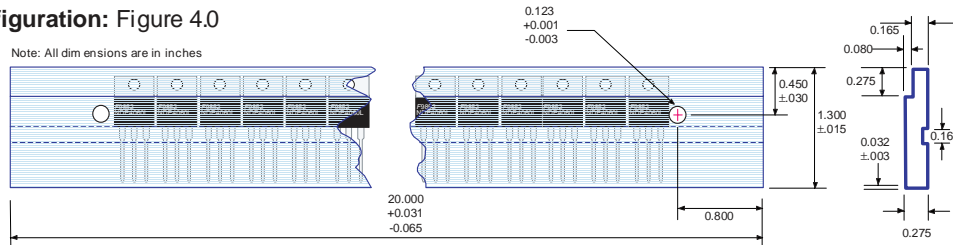
TO-220 Packaging Information		
Packaging Option	Standard (no flow code)	S62Z
Packaging type	Rail/Tube	BULK
Qty per Tube/Box	45	300
Box Dimension (mm)	530x130x83	114x102x51
Max qty per Box	1,080	1,500
Weight per unit (gm)	1.4378	1.4378
Note/Comments		



## TO-220 bulk Packing Configuration: Figure 3.0

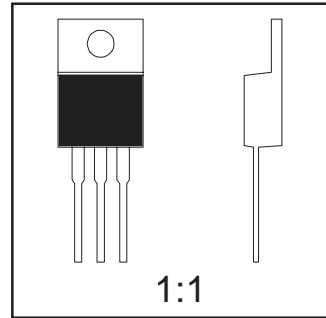
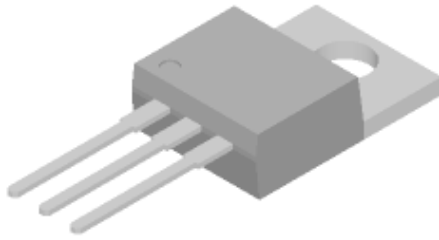


## TO-220 Tube Configuration: Figure 4.0



**TO-220 Tape and Reel Data and Package Dimensions, continued**

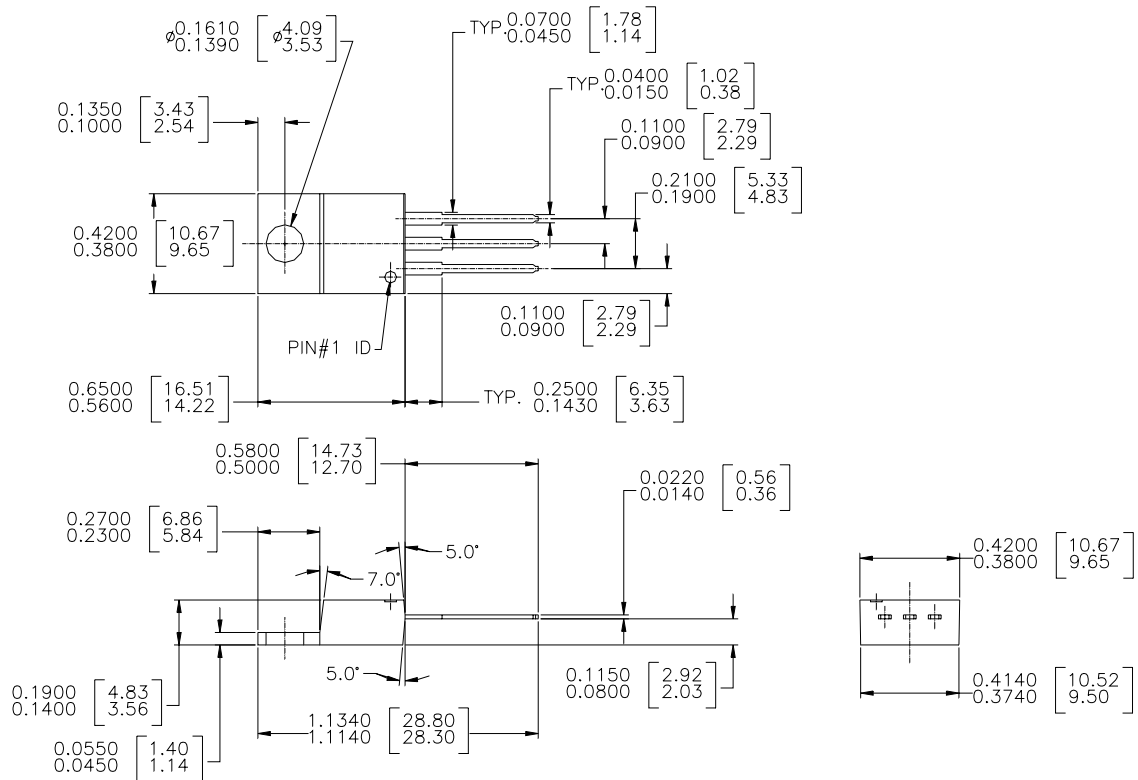
**TO-220 (FS PKG Code 37)**



Scale 1:1 on letter size paper

Dimensions shown below are in:  
inches [millimeters]

Part Weight per unit (gram): 1.4378



NOTE : UNLESS OTHERWISE SPECIFIED

1. STANDARD LEAD FINISH :  
200 MICROINCHES / 5.08 MICRON MINIMUM  
LEAD / TIN 15/85 ON OLIN 194 COPPER OR EQUIVALENT

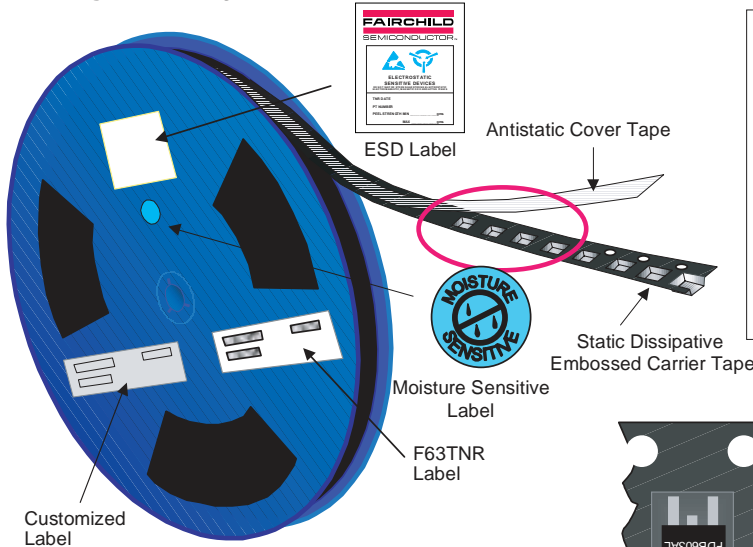
2. DIMENSION BASED ON JEDEC STANDARD TO-220  
VARIATION AB, ISSUE J, DATED 3/24/87

TO 220 3 LEAD

# TO-263AB/D<sup>2</sup>PAK Tape and Reel Data and Package Dimensions



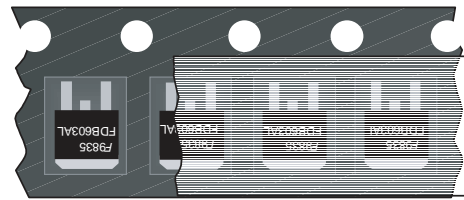
## TO-263AB/D<sup>2</sup>PAK Packaging Configuration: Figure 1.0



### Packaging Description:

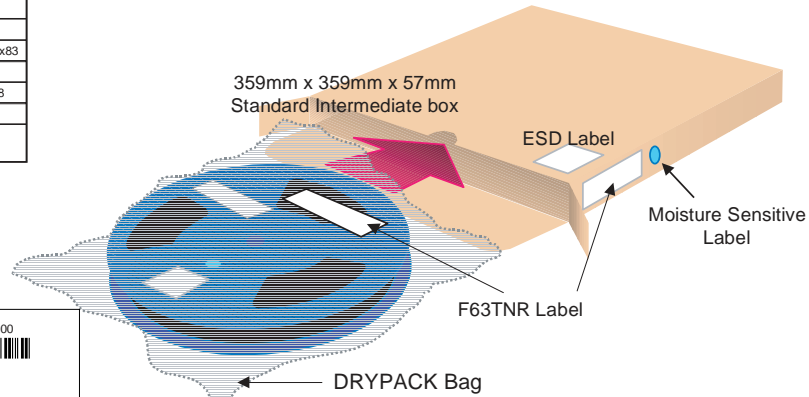
TO-263/D<sup>2</sup>PAK parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 800 units per 13" or 330cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). This and some other options are further described in the Packaging Information table.

These full reels are individually barcode labeled, dry packed, and placed inside a standard intermediate box (illustrated in figure 1.0) made of recyclable corrugated brown paper. One box contains one reel maximum. And these boxes are placed inside a barcode labeled shipping box which comes in different sizes depending on the number of parts shipped.



TO-263AB/D<sup>2</sup>PAK Unit Orientation

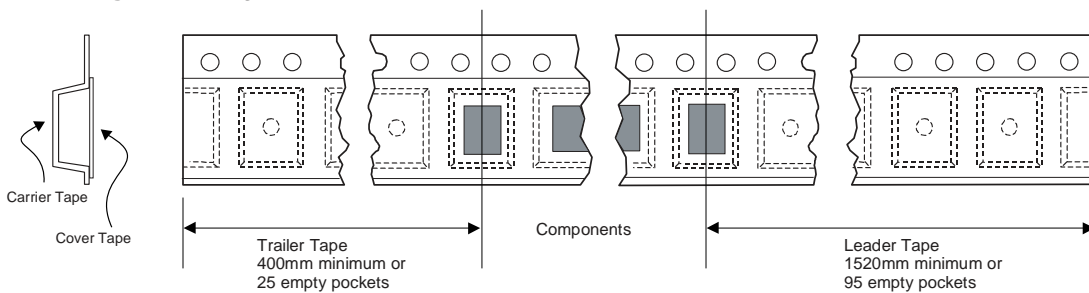
TO-263AB/D <sup>2</sup> PAK Packaging Information		
Packaging Option	Standard (no flow code)	L86Z
Packaging type	TNR	Rail/Tube
Qty per Reel/Tube/Bag	800	45
Reel Size	13" Dia	-
Box Dimension (mm)	359x359x57	530x130x83
Max qty per Box	800	1,080
Weight per unit (gm)	1.4378	1.4378
Weight per Reel	1.6050	-
Note/Comments		



### F63TNR Label sample



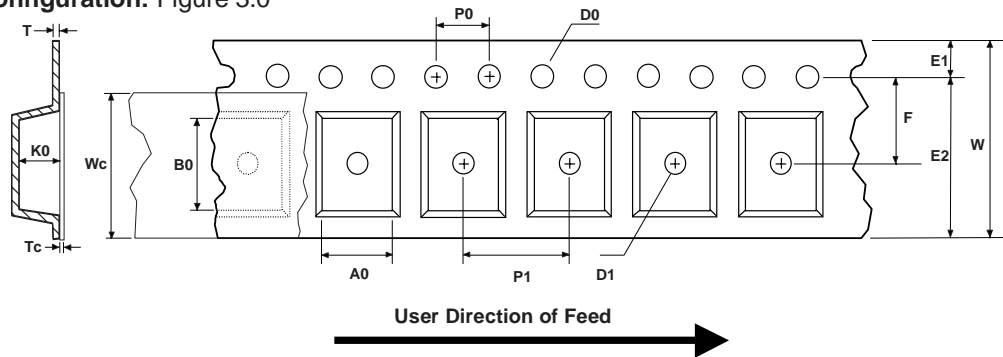
## TO-263AB/D<sup>2</sup>PAK Tape Leader and Trailer Configuration: Figure 2.0



# TO-263AB/D<sup>2</sup>PAK Tape and Reel Data and Package Dimensions, continued

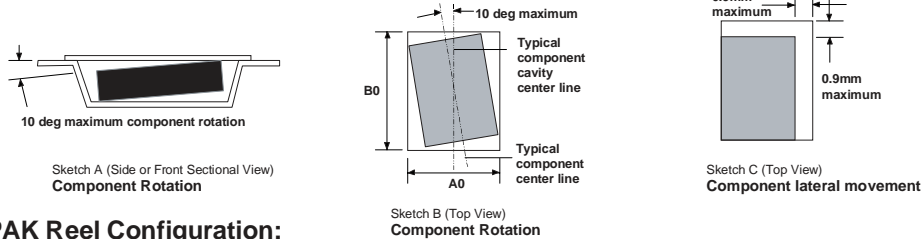
## TO-263AB/D<sup>2</sup>PAK Embossed Carrier Tape

Configuration: Figure 3.0

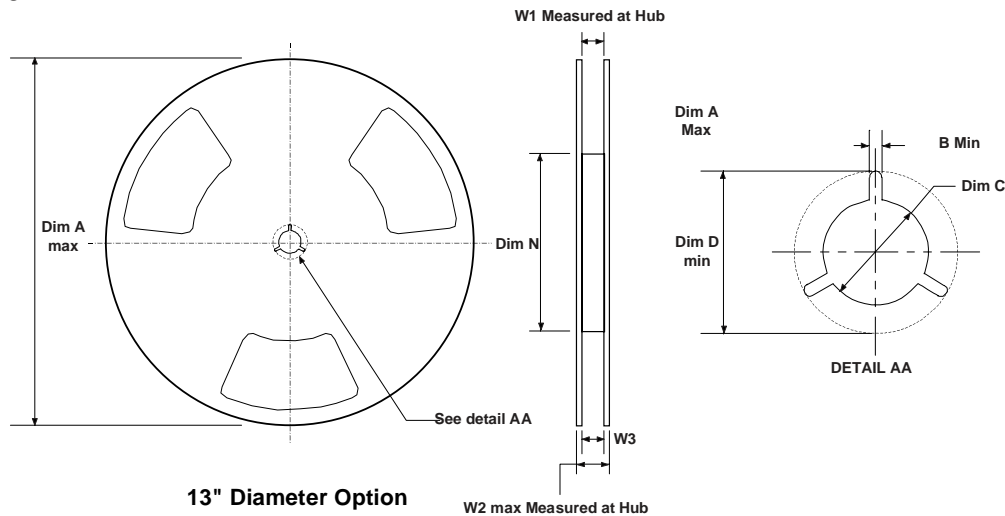


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
TO263AB/ D <sup>2</sup> PAK (24mm)	10.60 +/-0.10	15.80 +/-0.10	24.0 +/-0.3	1.55 +/-0.05	1.60 +/-0.10	1.75 +/-0.10	22.25 min	11.50 +/-0.10	16.0 +/-0.1	4.0 +/-0.1	4.90 +/-0.10	0.450 +/-0.150	21.0 +/-0.3	0.06 +/-0.02

Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



## TO-263AB/D<sup>2</sup>PAK Reel Configuration: Figure 4.0

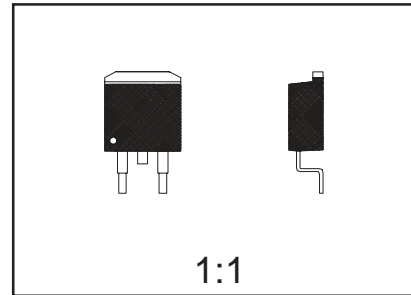
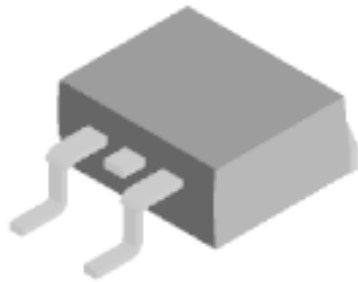


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
24mm	13" Dia	13.00 330	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	4.00 100	0.961 +0.078/-0.000 24.4 +2/0	1.197 30.4	0.941 - 0.1.079 23.9 - 27.4



TO-263AB/D<sup>2</sup>PAK Tape and Reel Data and Package Dimensions, continued

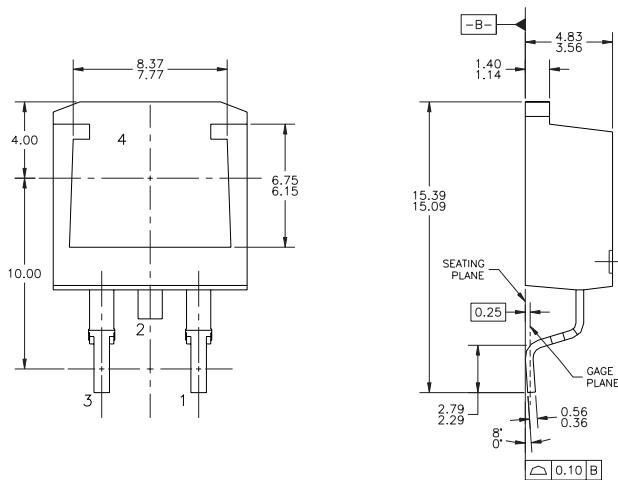
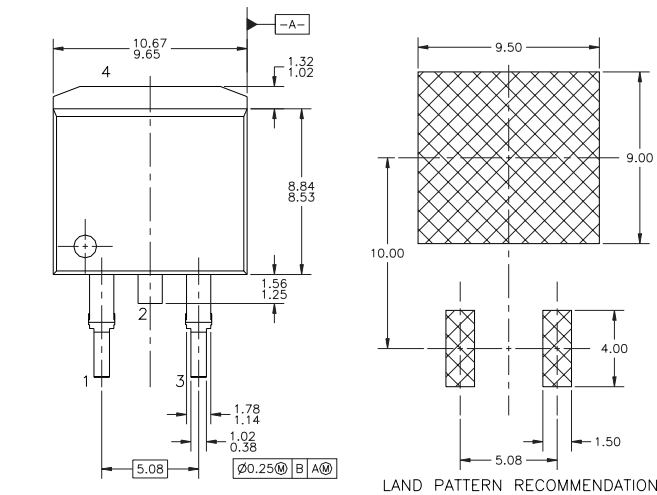
TO-263AB/D<sup>2</sup>PAK (FS PKG Code 45)



Scale 1:1 on letter size paper

Dimensions shown below are in:  
inches [millimeters]

Part Weight per unit (gram): 1.4378



- NOTES: UNLESS OTHERWISE SPECIFIED  
 A) ALL DIMENSIONS ARE IN MILLIMETERS.  
 B) STANDARD LEAD FINISH:  
 200 MICROINCHES / 5.08 MICROMETERS MIN.  
 LEAD/TIN 15/85 ON OLIN 194 COPPER OR  
 EQUIVALENT.  
 C) MAXIMUM VERTICAL BURR ON HEATSINK NOT  
 TO EXCEED 0.003 INCH / 0.05mm.  
 D) NO PACKAGE CHIPS, CRACKS OR SURFACE  
 IDENTIFICATION ALLOWED AFTER FORMING.  
 E) REFERENCE JEDEC, TO-263, ISSUE C,  
 VARIATION AB, DATED 2/92.