In [1]:
```
import pandas as pd
import numpy as np
```

In [2]:
```
train = pd.read_csv('fashion-mnist_train.csv')
test = pd.read_csv('fashion-mnist_test.csv')
x_train = train.drop(['label'],axis=1)
y_train = train['label']
x_test = test.drop(['label'],axis=1)
y_test = test['label']
x_test
```

Out[2]:

	pixel1	pixel2	pixel3	pixel4	pixel5	pixel6	pixel7	pixel8	pixel9	pixel10	...	pixel77
0	0	0	0	0	0	0	0	9	8	0	...	10
1	0	0	0	0	0	0	0	0	0	0	...	3
2	0	0	0	0	0	0	14	53	99	17	...	
3	0	0	0	0	0	0	0	0	0	161	...	13
4	0	0	0	0	0	0	0	0	0	0	...	
...	...	...	...	...	...	...	...	...	...	...	...	.
9995	0	0	0	0	0	0	0	0	0	37	...	3
9996	0	0	0	0	0	0	0	0	0	0	...	
9997	0	0	0	0	0	0	0	0	0	0	...	17
9998	0	1	3	0	0	0	0	0	0	0	...	
9999	0	0	0	0	0	0	0	140	119	103	...	11

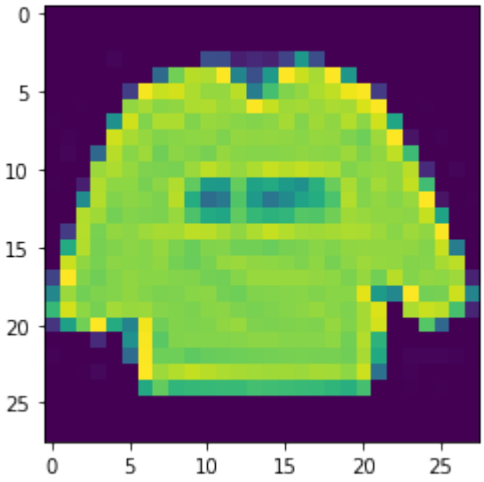
10000 rows × 784 columns

In [3]:
```
x_train = x_train.astype('float32') / 255.0
x_test = x_test.astype('float32') / 255.0

# Reshape the input data to the required shape (28, 28, 1)
x_train_reshaped = x_train.values.reshape(-1, 28, 28, 1)
x_test_reshaped = x_test.values.reshape(-1, 28, 28, 1)
```

In [16]:
```
for i in range(20):
    print(labels[y_train[i]])
    plt.imshow(x_train_reshaped[i])
    plt.show()
```

```
pullover
```




```
ankle boots
```


In [4]:
```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Flatten,Conv2D,MaxPooling2D
import matplotlib.pyplot as plt
```

In [5]:
```
model = Sequential()
```

In [6]:
```
model.add(Conv2D(filters=64,kernel_size=(3,3),activation='relu',input_shape
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.add(Dense(128,activation='relu'))
model.add(Dense(10,activation='softmax'))
model.compile(optimizer='adam',loss='sparse_categorical_crossentropy',metri
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 26, 26, 64)        640

 max_pooling2d (MaxPooling2D  (None, 13, 13, 64)       0
 )

 flatten (Flatten)           (None, 10816)             0

 dense (Dense)               (None, 128)               1384576

 dense_1 (Dense)             (None, 10)                1290

=================================================================
Total params: 1,386,506
Trainable params: 1,386,506
Non-trainable params: 0
_________________________________________________________________
```

In [7]:
```
model.fit(x_train_reshaped, y_train, epochs=5, batch_size=32, validation_da
```

```
Epoch 1/5
1875/1875 [==============================] - 32s 17ms/step - loss: 0.3755
- accuracy: 0.8669 - val_loss: 0.2893 - val_accuracy: 0.8956
Epoch 2/5
1875/1875 [==============================] - 33s 18ms/step - loss: 0.2564
- accuracy: 0.9058 - val_loss: 0.2682 - val_accuracy: 0.9061
Epoch 3/5
1875/1875 [==============================] - 33s 18ms/step - loss: 0.2107
- accuracy: 0.9224 - val_loss: 0.2312 - val_accuracy: 0.9145
Epoch 4/5
1875/1875 [==============================] - 34s 18ms/step - loss: 0.1748
- accuracy: 0.9349 - val_loss: 0.2397 - val_accuracy: 0.9182
Epoch 5/5
1875/1875 [==============================] - 34s 18ms/step - loss: 0.1488
- accuracy: 0.9445 - val_loss: 0.2270 - val_accuracy: 0.9207
```

Out[7]:
```
<keras.callbacks.History at 0x1c2e391bca0>
```

In [8]:
```
loss,acc = model.evaluate(x_test_reshaped,y_test)
```

```
313/313 [==============================] - 2s 7ms/step - loss: 0.2270 - a
ccuracy: 0.9207
```

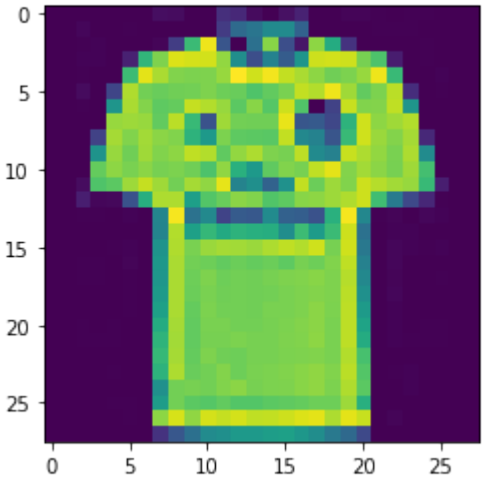
In [9]:
```
labels = ['t-shirt','trouser','pullover','dress','coat','sandal','sneakers'
```

In [10]:
```
predictions = model.predict(x_test_reshaped[:1])
```

In [11]:
```
label = labels[np.argmax(predictions)]
```

In [12]:
```
print(label)
plt.imshow(x_test_reshaped[:1][0])
plt.show()
```

```
t-shirt
```



In [ ]:

In [ ]: