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# PyGFETdb

Nov 13, 2019



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## Contents:

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<b>1</b>	<b>User Guide</b>	<b>1</b>
<b>2</b>	<b>PyGFETdb</b>	<b>3</b>
2.1	PyGFETdb package . . . . .	3
2.1.1	Subpackages . . . . .	3
2.1.1.1	PyGFETdb.GuiDBView package . . . . .	3
2.1.2	Submodules . . . . .	5
2.1.3	PyGFETdb.AnalyzeData module . . . . .	5
2.1.4	PyGFETdb.DB module . . . . .	6
2.1.5	PyGFETdb.DBAalyze module . . . . .	6
2.1.6	PyGFETdb.DBCore module . . . . .	6
2.1.7	PyGFETdb.DBSearch module . . . . .	7
2.1.8	PyGFETdb.DataClass module . . . . .	8
2.1.9	PyGFETdb.DataStructures module . . . . .	10
2.1.10	PyGFETdb.GlobalFunctions module . . . . .	10
2.1.11	PyGFETdb.Multiprocessing module . . . . .	10
2.1.12	PyGFETdb.NoiseModel module . . . . .	10
2.1.13	PyGFETdb.PlotDataClass module . . . . .	11
2.1.14	PyGFETdb.PlotFunctions module . . . . .	12
2.1.15	PyGFETdb.QuantityClass module . . . . .	12
2.1.16	PyGFETdb.Thread module . . . . .	12
2.1.17	Module contents . . . . .	12
	<b>Python Module Index</b>	<b>13</b>
	<b>Index</b>	<b>15</b>



# CHAPTER 1

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## User Guide

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Under construction.



## 2.1 PyGFETdb package

### 2.1.1 Subpackages

#### 2.1.1.1 PyGFETdb.GuiDBView package

##### Submodules

##### PyGFETdb.GuiDBView.GuiDBView module

Spyder Editor

This is a temporary script file.

```

class PyGFETdb.GuiDBView.GuiDBView.AppDataExp (ACData,           CalcIrmsNok=False,
                                             IsDC=False)
    Bases: PySide2.QtWidgets.QMainWindow
    ButPltVsXClick ()
    CreateNewPlotFreq ()
    GenTrtInfo (trt, cy)
    LstCyChange ()
    LstTrtChange ()
    LstVdsChange ()
    LstVgsChange ()
    PltVsVgsClick ()
    UpdatePltVsFreq ()

```

```
staticMetaObject = <PySide2.QtCore.QMetaObject object>

class PyGFETdb.GuiDBView.GuiDBView.DBViewApp
    Bases: PySide2.QtWidgets.QMainWindow

    ACFields = {'ACcharacts.AnalyteCon': ('AnalyteCon', 8, 0, 1), 'ACcharacts.Comments':
    ACUpdateFields = {3: 'IsOK', 4: 'IsCmp', 5: 'Ph', 6: 'IonStrength', 7: 'FuncStep'
    ButAnalyzeACClick()
    ButAnalyzeDCClick()
    ButDeleteACClick()
    ButDeleteDCClick()
    ButExportACClick()
    ButExportDCClick()
    ButResetSearchClick()
    ButSetDataClick()
    ButViewACClick()
    ButViewDCClick()
    CloseFigures()
    ConnectLst()
    DCFields = {'DCcharacts.AnalyteCon': ('AnalyteCon', 8, 1, 1), 'DCcharacts.Comments':
    DCUpdateFields = {3: 'IsOK', 4: 'IsCmp', 5: 'Ph', 6: 'IonStrength', 7: 'FuncStep'
    DeleteCharacts(Tbl, DBTable)
    DevReport()
    DisconnectLst()
    FillCharactTable(Tbl, DBTable, Fields, Ids)
    FillList(Lst, Field)
    FillTable(Tbl, Rows, Fields, Offset=0)
    GetDataFromDb(AC=False, DC=False)
    GetTableSelectCol(Table, Col=0, String=False)
    InitMenu()
    LstAreaChange()
    LstContactChange()
    LstDevicesChange()
    LstLChange()
    LstMasksChange()
    LstPassChange()
    LstSubstratesChange()
    LstTypesChange()
```



```

LstWChange ()
LstWafersChange ()
OutFigFormats = ('svg', 'png')
SaveFigures ()
TblACCellChanged (row, column)
TblDCCellChanged (row, column)
TblTrtsCellChanged (row, column)

TrtFields = {'Devices.Comments': ('D-Comments', 11, 0, 1), 'Devices.ExpOK': ('D-ExpOK', 11, 0, 1),
TrtSearchFields = ['Trts.idTrts', 'Trts.Name', 'TrtTypes.Name', 'TrtTypes.Length', 'TrtTypes.Width', 'TrtTypes.Pass', 'TrtTypes.Contact', 'TrtTypes.Area', 'TrtTypes.Table']
TrtsUpdateFields = {10: ('Trts', 'Comments', 'idTrts=', 0), 11: ('Devices', 'Comments', 'idDevices=', 0), 12: ('Devices', 'ExpOK', 'idDevices=', 0)}
UpdateSearchList (Devices=True, Types=True, Length=True, Width=True, Pass=True, Contact=True, Area=True, Table=True)
UpdateWafersList (Substrates=True, Masks=True, Wafers=True)
ViewAxsAC = ('GmMag', 'IdsPoly', 'GMPoly')
ViewAxsDC = ('Gm', 'Ids', 'Rds')
staticMetaObject = <PySide2.QtCore.QMetaObject object>

PyGFETdb.GuiDBView.GuiDBView.main()

```

## Module contents

Created on Tue Nov 15 17:27:23 2016

@author: aguimera

## 2.1.2 Submodules

### 2.1.3 PyGFETdb.AnalyzeData module

@author: Anton Guimerà @version: 0.1b

Revision history

- 0.1b – First version

TODO implement graph for selected channels

PyGFETdb.AnalyzeData.**CalcDCparams** (DevDC)

PyGFETdb.AnalyzeData.**CalcGM** (DevDC, DevAC=None, Order=10)

PyGFETdb.AnalyzeData.**CalcGMCh** (DCdat, ACdat=None, Order=10)

PyGFETdb.AnalyzeData.**CalcNoiseIrms** (Dev, Fmin=None, Fmax=None, IsOkFilt=True)

PyGFETdb.AnalyzeData.**CalcNoiseIrmsCh** (ChDat, Fmin=None, Fmax=None, IsOkFilt=True)

PyGFETdb.AnalyzeData.**CheckIsOK** (DevDC, DevAC=None, RdsRange=[400, 10000.0])

PyGFETdb.AnalyzeData.**FitACNoise** (Dev, Fmin=None, Fmax=None, IsOkFilt=True)

PyGFETdb.AnalyzeData.**InterpolatePSD** (DevACVals, Points=100)

## 2.1.4 PyGFETdb.DB module

Created on Tue Feb 20 13:42:01 2018

@author: aguimera

## 2.1.5 PyGFETdb.DBAnalyze module

Created on Tue Jun 27 15:08:05 2017

@author: aguimera

```
PyGFETdb.DBAnalyze.CalcTLM(Groups, Vds=None, Ax=None, Color=None, DebugPlot=False, Label=None)
PyGFETdb.DBAnalyze.CalcTLM2(Groups, Vds=None, Ax=None, Color=None, DebugPlot=False, Label=None, Error=4e-07, TrackResistance=None)
PyGFETdb.DBAnalyze.CreateCycleColors(Vals)
PyGFETdb.DBAnalyze.GetParam(Data, Param, Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
PyGFETdb.DBAnalyze.PlotGroupBy(GroupBase, GroupBy, **kwargs)
PyGFETdb.DBAnalyze.PlotGroupBySearchAndGetParam(GroupBase, GroupBy, **kwargs)
PyGFETdb.DBAnalyze.PlotMeanStd(Data, Xvar, Yvar, Vgs=None, Vds=None, Ax=None, Ud0Norm=True, Color='r', PlotOverlap=False, PlotOverlapMean=False, PlotStd=True, label=None, ScaleFactor=1, **kwargs)
PyGFETdb.DBAnalyze.PlotXYVars(Data, Xvar, Yvar, Vgs, Vds, Ud0Norm=True, label=None, Ax=None, Color=None, **kwargs)
PyGFETdb.DBAnalyze.SearchAndGetParam(Groups, Plot=True, Boxplot=False, ParamUnits=None, **kwargs)
PyGFETdb.DBAnalyze.SearchAndPlot(Groups, Func=<function PlotMeanStd>, **kwargs)
```

## 2.1.6 PyGFETdb.DBCore module

Created on Tue Nov 15 23:15:19 2016

@author: aguimera

```
class PyGFETdb.DBCore.PyFETdb(host=None, user=None, passwd=None, db=None, Update=True)
    Bases: object
        CreateQueryConditions(Conditions)
        DeleteCharact(Table, Ids)
        FindFillOutput(query, values, Output)
        GetCharactFromId(Table, Ids, Trts, Last=False, GetGate=False)
        GetCharactInfo(Table, Conditions, Output)
        GetData(Conditions, DC=True, AC=True, Last=False, Date=None, IsCmp=None)
        GetData2(Conditions, Table, Last=True, GetGate=False)
        GetDevicesInfo(Conditions, Output=None)
        GetGateFromId(idg)
```

```

GetId (Table, Value, Field='Name', NewVals=None)
GetTrtCharact (Table, TrtId, TrtName=None, Last=False, Date=None, IsCmp=None)
GetTrtCharact2 (Table, TrtId, TrtName, Last=False)
GetTrtsInfo (Conditions, Output=None)
InsertCharact (DCVals, Fields, ACVals=None, OptFields=None, TrtTypeFields=None, Over-
    Write=True)
InsertGateCharact (DCVals, Fields, OverWrite=True)
MultiSelect (Table, Conditions, FieldsOut, Order=None)
NewRow (Table, Fields)
PrintQuery = False
UpdateRow (Table, Fields, Condition)

```

## 2.1.7 PyGFETdb.DBSearch module

Created on Fri Jan 12 13:12:37 2018

@author: aguimera

```

PyGFETdb.DBSearch.CheckConditionsCharTable (Conditions, Table)
PyGFETdb.DBSearch.DataSelection (Data, Param, Range, Function=None, InSide=True,
    Name=None, ParArgs={'Ud0Norm': False, 'Vds': None,
    'Vgs': None})
PyGFETdb.DBSearch.FindCommonValues (Parameter, Conditions, Table='ACcharacts', **kwargs)
PyGFETdb.DBSearch.GenBiosensGroups (CondBase, GroupBy='CharTable.FuncStep',
    AnalyteStep='Tromb', Analyte-
    GroupBy='CharTable.AnalyteCon')
PyGFETdb.DBSearch.GenGroups (GroupBase, GroupBy, LongName=True)
PyGFETdb.DBSearch.GetFromDB (Conditions, Table='ACcharacts', Last=True, GetGate=True, Outil-
    erFilter=None, DataSelectionConfig=None)

```

Get data from data base

This function returns data which meets with “Conditions” dictionary for sql select query constructor.

**Conditions** [dictionary, conditions to construct the sql select query.] The dictionary should follow this structure:

```
{ 'Table.Field <sql operator>' : iterable type of values }
```

### Example

```
{ 'Wafers.Name = ':'(B10803W17, B10803W11), 'CharTable.IsOK > ':'(0,) }
```

**Table** [string, optional. Possible values 'ACcharacts' or 'DCcharacts'.] The default value is 'ACcharacts'. Characterization table to get data

The characterization table of Conditions dictionary can be indicated as 'CharTable'. In that case 'CharTable' will be replaced by Table value.

**Last** [boolean, optional. If True (default value) just the last measured] data for each transistor is returned. If False, all measured data is returned

**Last** [boolean, optional. If True (default value) the gate measured data] is also obtained

**OutlierFilter** [dictionary, optional. (default 'None'),] If defined, dictionary to perform a statistical pre-evaluation of the data. The data that are not between the p25 and p75 percentile are not returned. The dictionary should follow this structure: {'Param':Value, -> Characterization parameter, ie. 'Ids', 'Vrms'...

'Vgs':Value, -> Vgs evaluation point 'Vds':Value, -> Vds evaluation point  
'Ud0Norm':Boolean} -> Indicates if Vgs is normalized to CNP

Return : tuple of (Data, Trts) Data: Dictionary with the data arranged as follows:

{ 'Transistor Name':list of PyGFET.DataClass.DataCharAC classes }

Trts: List of transistors

PyGFETdb.DBSearch.**RemoveOutliers** (Data, OutlierFilter)

PyGFETdb.DBSearch.**UpdateCharTableField** (Conditions, Value, Table='ACcharacts',  
Field='Comments')

## 2.1.8 PyGFETdb.DataClass module

Created on Fri Jun 16 17:43:50 2017

@author: aguimera

```
class PyGFETdb.DataClass.DataCharAC (Data)
    Bases: PyGFETdb.DataClass.DataCharDC

    CalcIRMS (Fmin, Fmax)

    FFmax = None

    FFmin = None

    FitNoise (Fmin, Fmax)

    GetFgm (**kwargs)

    GetFpsd (**kwargs)

    GetGmMag (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetGmPh (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetIrms (Vgs=None, Vds=None, Ud0Norm=False, NFmin=None, NFmax=None, **kwargs)

    GetIrmsIds (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetIrmsIds15 (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetIrmsIds2 (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetIrmsVds (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetNoA (Vgs=None, Vds=None, Ud0Norm=False, FFmin=None, FFmax=None, **kwargs)

    GetNoAIds2 (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetNoB (Vgs=None, Vds=None, Ud0Norm=False, FFmin=None, FFmax=None, **kwargs)

    GetPSD (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    GetVrms (Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

    NFmax = None
```

```

    NFmin = None
class PyGFETdb.DataClass.DataCharDC(Data)
    Bases: object
    CalcFEM(FEMn0=800000000000.0, FEMq=1.602176565e-19, FEMRc=300, FEMCdl=2e-06, FEMR-
        cVgs=None, **kwargs)
    CalcGMPoly(PolyOrder=None)
    CalcIdsPoly(PolyOrder=None)
    CalcUd0()
    CheckVgsRange(Vgs, iVds, Ud0Norm)
    GetAnalyteCon(**kwargs)
    GetComments(**kwargs)
    GetContact(**kwargs)
    GetDateTime(**kwargs)
    GetFEMmu(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetFEMmuGm(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetFEMn(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetFuncStep(**kwargs)
    GetGM(Vgs=None, Vds=None, Normalize=False, Ud0Norm=False, **kwargs)
    GetGMMax(**kwargs)
    GetGMNorm(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetGMV(AbsVal=True, **kwargs)
    GetGds(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetIds(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetIg(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetIonStrength(**kwargs)
    GetLength(**kwargs)
    GetName(**kwargs)
    GetPass(**kwargs)
    GetPh(**kwargs)
    GetRds(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetTime(**kwargs)
    GetTypeName(**kwargs)
    GetUd0(Vds=None, Vgs=None, Ud0Norm=False, Normalize=False, **kwargs)
    GetUd0Vds(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)
    GetVds(**kwargs)
    GetVdsIndexes(Vds)
    GetVgs(Vgs=None, Vds=None, Ud0Norm=False, **kwargs)

```

```
GetWL (**kwargs)
GetWidth (**kwargs)
IntMethod = 'linear'
PolyOrder = 10
UpdateData (Data)
PyGFETdb.DataClass.FitFNoise (Freq, psd)
PyGFETdb.DataClass.FitLogFNoise (Freq, psd)
PyGFETdb.DataClass.Fnoise (f, a, b)
PyGFETdb.DataClass.LogFNoise (f, a, b)
class PyGFETdb.DataClass.PyFETPlotDataClass (Size=(9, 6))
    Bases: PyGFETdb.PlotDataClass.PyFETPlotBase
    AxesProp = {'FEMmu': (1, 0, 'Vgs'), 'FEMmuGm': (1, 0, 'Vgs'), 'FEMn': (0, 0, 'Vgs'),
    ColorParams = {'Contact': ('TrtTypes', 'Contact'), 'Date': (None, 'DateTime'), 'Devic
    GetColorValue (Data, ColorOn)
    Plot (Data, Vgs=None, Vds=None, Ud0Norm=False, PltIsOK=True, ColorOnVgs=False, **kwargs)
    PlotDataCh (DataDict, Trts, Vgs=None, Vds=None, Ud0Norm=False, PltIsOK=True, Col-
        orOn='Trt')
    PlotDataSet (DataDict, Trts=None, Vgs=None, Vds=None, Ud0Norm=False, PltIsOK=True, Col-
        orOn='Trt', MarkOn='Cycle', **kwargs)
```

## 2.1.9 PyGFETdb.DataStructures module

@author: Anton Guimerà @version: 0.1b

Revsion history

- 0.1b – First version

TODO implement graph for selected channels

```
PyGFETdb.DataStructures.InitACRecord (nVds, nVgs, nFgm, nFpsd, ChNames)
```

```
PyGFETdb.DataStructures.InitDCRecord (nVds, nVgs, ChNames, Gate=True)
```

```
PyGFETdb.DataStructures.LoadDataFromFile (FileName)
```

### 2.1.10 PyGFETdb.GlobalFunctions module

### 2.1.11 PyGFETdb.Multiprocessing module

### 2.1.12 PyGFETdb.NoiseModel module

@author: Anton Guimerà @version: 0.1b

Revsion history

- 0.1b – First version

```
PyGFETdb.NoiseModel.CalcFreqIndexes (Freq, Fmin=None, Fmax=None)
```

```

PyGFETdb.NoiseModel.FitFNoise (Freq, psd, Fmin=None, Fmax=None)
    return a, b, pcov
PyGFETdb.NoiseModel.FitLogFNoise (Freq, psd, Fmin=None, Fmax=None)
PyGFETdb.NoiseModel.FitNoise (Freq, psd, Fmin=None, Fmax=None)
PyGFETdb.NoiseModel.Fnoise (f, a, b)
    return a/f^b
PyGFETdb.NoiseModel.FnoiseTh (f, a, b, c)
    return a/f^b+c
PyGFETdb.NoiseModel.LogFNoise (f, a, b)
    return b*f+a
PyGFETdb.NoiseModel.PSDintegral (Freq, psd, Fmin=1, Fmax=5000.0)
    return Irms

```

### 2.1.13 PyGFETdb.PlotDataClass module

Created on Wed Feb 1 10:31:02 2017

@author: aguimera

```

class PyGFETdb.PlotDataClass.MyCycle (iterable)
    Bases: object

    next ()

    reset ()

class PyGFETdb.PlotDataClass.PyFETPlot
    Bases: PyGFETdb.PlotDataClass.PyFETPlotBase

    AxsProp = {'FitErrA': (1, 'Vgs', 0), 'FitErrB': (1, 'Vgs', 0), 'GMPoly': (0, 'Vgs', 1)
    ColorParams = {'Contact': ('TrtTypes', 'Contact'), 'Date': (None, 'DateTime'), 'Leng
    GetColorValue (cy, ColorOn)

    Plot (Data, iVds=None, iVgs=None, PltUd0=False, PltIsOK=False, ColorOnVgs=False)
    PlotDataCh (Data, PltUd0=False, PltIsOK=False)
    PlotDataSet (Data, Trts, PltUd0=False, PltIsOK=False, ColorOn='Trt')

class PyGFETdb.PlotDataClass.PyFETPlotBase
    Bases: object

    AddAxes (AxNames, Xvar=None)
    AddLegend (Axn=None, fontsize='xx-small')
    ClearAxes ()

    ColorSet = <matplotlib.colors.LinearSegmentedColormap object>
    CreateFigure (Size=(9, 6))
    FigExists ()
    NextColor ()
    NextLine ()
    NextMark ()

```

```
SetAxesLabels (fontsize='medium', labelsiz=5, scilimits=(-2, 2), RdsLim=(100, 15000.0))
SetAxesXLabels (Xvar=None)
line = '-'
lines = <PyGFETdb.PlotDataClass.MyCycle object>
mark = ''
marks = <PyGFETdb.PlotDataClass.MyCycle object>
setNColors (ncolors)

class PyGFETdb.PlotDataClass.PyFETPlotParam
    Bases: PyGFETdb.PlotDataClass.PyFETPlotBase
    AxsProp = {'FitErrA': (0, None, 1), 'FitErrB': (0, None, 1), 'GMPoly': (1, 'Vds', 0),
    Plot (Data, xVar, Bias, PltUd0)
    PlotDataSet (Data, Trts, xVar, Bias, PltUd0=False)
    SetAxesXLabels (Xvar, fontsize='medium', scilimits=(-2, 2))
    xVarProp = {'Area': ('TrtTypes', 'Area', 1), 'Date': (None, 'DateTime', 0), 'Length'
```

## 2.1.14 PyGFETdb.PlotFunctions module

## 2.1.15 PyGFETdb.QuantityClass module

## 2.1.16 PyGFETdb.Thread module

## 2.1.17 Module contents

Created on Tue Nov 15 17:27:23 2016

@author: aguimera



### p

- PyGFETdb, [12](#)
- PyGFETdb.AnalyzeData, [5](#)
- PyGFETdb.DataClass, [8](#)
- PyGFETdb.DataStructures, [10](#)
- PyGFETdb.DB, [6](#)
- PyGFETdb.DBAnalyze, [6](#)
- PyGFETdb.DBCore, [6](#)
- PyGFETdb.DBSearch, [7](#)
- PyGFETdb.GuidBView, [5](#)
- PyGFETdb.GuidBView.GuidBView, [3](#)
- PyGFETdb.NoiseModel, [10](#)
- PyGFETdb.PlotDataClass, [11](#)



## A

ACFields (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 4

ACUpdateFields (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 4

AddAxes () (*PyGFETdb.PlotDataClass.PyFETPlotBase* method), 11

AddLegend () (*PyGFETdb.PlotDataClass.PyFETPlotBase* method), 11

AppDataExp (class in *PyGFETdb.GuiDBView.GuiDBView*), 3

AxsProp (*PyGFETdb.DataClass.PyFETPlotDataClass* attribute), 10

AxsProp (*PyGFETdb.PlotDataClass.PyFETPlot* attribute), 11

AxsProp (*PyGFETdb.PlotDataClass.PyFETPlotParam* attribute), 12

ButResetSearchClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButSetDataClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButViewACClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButViewDCClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

## B

ButAnalyzeACClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButAnalyzeDCClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButDeleteACClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButDeleteDCClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButExportACClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButExportDCClick () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 4

ButPltVsXClick () (*PyGFETdb.GuiDBView.GuiDBView.AppDataExp* method), 3

CalcDCparams () (in module *PyGFETdb.AnalyzeData*), 5

CalcFEM () (*PyGFETdb.DataClass.DataCharDC* method), 9

CalcFreqIndexes () (in module *PyGFETdb.NoiseModel*), 10

CalcGM () (in module *PyGFETdb.AnalyzeData*), 5

CalcGMCh () (in module *PyGFETdb.AnalyzeData*), 5

CalcGMPoly () (*PyGFETdb.DataClass.DataCharDC* method), 9

CalcIdsPoly () (*PyGFETdb.DataClass.DataCharDC* method), 9

CalcIRMS () (*PyGFETdb.DataClass.DataCharAC* method), 8

CalcNoiseIrms () (in module *PyGFETdb.AnalyzeData*), 5

CalcNoiseIrmsCh () (in module *PyGFETdb.AnalyzeData*), 5

CalcTLM () (in module *PyGFETdb.DBAnalyze*), 6

CalcTLM2 () (in module *PyGFETdb.DBAnalyze*), 6

CalcUd0 () (*PyGFETdb.DataClass.DataCharDC* method), 9

CheckConditionsCharTable () (in module *PyGFETdb.DBSearch*), 7

CheckIsOK () (in module *PyGFETdb.AnalyzeData*), 5

CheckVgsRange () (*PyGFETdb.DataClass.DataCharDC* method), 9

ClearAxes() (PyGFETdb.PlotDataClass.PyFETPlotBase method), 11  
 CloseFigures() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 ColorParams (PyGFETdb.DataClass.PyFETPlotDataClass attribute), 10  
 ColorParams (PyGFETdb.PlotDataClass.PyFETPlot attribute), 11  
 ColorSet (PyGFETdb.PlotDataClass.PyFETPlotBase attribute), 11  
 ConnectLst() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 CreateCycleColors() (in module PyGFETdb.DBAnalyze), 6  
 CreateFigure() (PyGFETdb.PlotDataClass.PyFETPlotBase method), 11  
 CreateNewPlotFreq() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp method), 3  
 CreateQueryConditions() (PyGFETdb.DBCore.PyFETdb method), 6

## D

DataCharAC (class in PyGFETdb.DataClass), 8  
 DataCharDC (class in PyGFETdb.DataClass), 9  
 DataSelection() (in module PyGFETdb.DBSearch), 7  
 DBViewApp (class in PyGFETdb.GuiDBView.GuiDBView), 4  
 DCFields (PyGFETdb.GuiDBView.GuiDBView.DBViewApp attribute), 4  
 DCUpdateFields (PyGFETdb.GuiDBView.GuiDBView.DBViewApp attribute), 4  
 DeleteCharact() (PyGFETdb.DBCore.PyFETdb method), 6  
 DeleteCharacts() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 DevReport() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 DisconnectLst() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

## F

FFmax (PyGFETdb.DataClass.DataCharAC attribute), 8  
 FFmin (PyGFETdb.DataClass.DataCharAC attribute), 8  
 FigExists() (PyGFETdb.PlotDataClass.PyFETPlotBase method), 11  
 FillCharactTable() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 FillList() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

FillTable() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 FindCommonValues() (in module PyGFETdb.DBSearch), 7  
 FindFillOutput() (PyGFETdb.DBCore.PyFETdb method), 6  
 FitACNoise() (in module PyGFETdb.AnalyzeData), 5  
 FitFNoise() (in module PyGFETdb.DataClass), 10  
 FitFNoise() (in module PyGFETdb.NoiseModel), 10  
 FitLogFNoise() (in module PyGFETdb.NoiseModel), 11  
 FitNoise() (PyGFETdb.DataClass.DataCharAC method), 8  
 Fnoise() (in module PyGFETdb.DataClass), 10  
 Fnoise() (in module PyGFETdb.NoiseModel), 11  
 FnoiseTh() (in module PyGFETdb.NoiseModel), 11

## G

GenBiosensGroups() (in module PyGFETdb.DBSearch), 7  
 GenGroups() (in module PyGFETdb.DBSearch), 7  
 GenTrtInfo() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp method), 3  
 GetAnalyteCon() (PyGFETdb.DataClass.DataCharDC method), 9  
 GetCharactFromId() (PyGFETdb.DBCore.PyFETdb method), 6  
 GetContactInfo() (PyGFETdb.DBCore.PyFETdb method), 6  
 GetColorValue() (PyGFETdb.DataClass.PyFETPlotDataClass method), 10  
 GetDeviceValue() (PyGFETdb.PlotDataClass.PyFETPlot method), 11  
 GetComments() (PyGFETdb.DataClass.DataCharDC method), 9  
 GetConnect() (PyGFETdb.DataClass.DataCharDC method), 9  
 GetData() (PyGFETdb.DBCore.PyFETdb method), 6  
 GetData2() (PyGFETdb.DBCore.PyFETdb method), 6  
 GetDataFromDb() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4  
 GetDateTime() (PyGFETdb.DataClass.DataCharDC method), 9  
 GetDevicesInfo() (PyGFETdb.DBCore.PyFETdb method), 6  
 GetFEMmu() (PyGFETdb.DataClass.DataCharDC method), 9

GetFEMmuGm () (PyGFETdb.DataClass.DataCharDC method), 9	GetParam () (in module PyGFETdb.DBAnalyze), 6
GetFEMn () (PyGFETdb.DataClass.DataCharDC method), 9	GetPass () (PyGFETdb.DataClass.DataCharDC method), 9
GetFgm () (PyGFETdb.DataClass.DataCharAC method), 8	GetPh () (PyGFETdb.DataClass.DataCharDC method), 9
GetFpsd () (PyGFETdb.DataClass.DataCharAC method), 8	GetPSD () (PyGFETdb.DataClass.DataCharAC method), 8
GetFromDB () (in module PyGFETdb.DBSearch), 7	GetRds () (PyGFETdb.DataClass.DataCharDC method), 9
GetFuncStep () (PyGFETdb.DataClass.DataCharDC method), 9	GetTableSelectCol () (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4
GetGateFromId () (PyGFETdb.DBCore.PyFETdb method), 6	GetTime () (PyGFETdb.DataClass.DataCharDC method), 9
GetGds () (PyGFETdb.DataClass.DataCharDC method), 9	GetTrtCharact () (PyGFETdb.DBCore.PyFETdb method), 7
GetGM () (PyGFETdb.DataClass.DataCharDC method), 9	GetTrtCharact2 () (PyGFETdb.DBCore.PyFETdb method), 7
GetGmMag () (PyGFETdb.DataClass.DataCharAC method), 8	GetTrtsInfo () (PyGFETdb.DBCore.PyFETdb method), 7
GetGMMax () (PyGFETdb.DataClass.DataCharDC method), 9	GetTypeName () (PyGFETdb.DataClass.DataCharDC method), 9
GetGMNorm () (PyGFETdb.DataClass.DataCharDC method), 9	GetUd0 () (PyGFETdb.DataClass.DataCharDC method), 9
GetGmPh () (PyGFETdb.DataClass.DataCharAC method), 8	GetUd0Vds () (PyGFETdb.DataClass.DataCharDC method), 9
GetGMV () (PyGFETdb.DataClass.DataCharDC method), 9	GetVds () (PyGFETdb.DataClass.DataCharDC method), 9
GetId () (PyGFETdb.DBCore.PyFETdb method), 7	GetVdsIndexes () (PyGFETdb.DataClass.DataCharDC method), 9
GetIds () (PyGFETdb.DataClass.DataCharDC method), 9	GetVgs () (PyGFETdb.DataClass.DataCharDC method), 9
GetIg () (PyGFETdb.DataClass.DataCharDC method), 9	GetVrms () (PyGFETdb.DataClass.DataCharAC method), 8
GetIonStrength () (PyGFETdb.DataClass.DataCharDC method), 9	GetWidth () (PyGFETdb.DataClass.DataCharDC method), 10
GetIrms () (PyGFETdb.DataClass.DataCharAC method), 8	GetWL () (PyGFETdb.DataClass.DataCharDC method), 9
GetIrmsIds () (PyGFETdb.DataClass.DataCharAC method), 8	
GetIrmsIds15 () (PyGFETdb.DataClass.DataCharAC method), 8	
GetIrmsIds2 () (PyGFETdb.DataClass.DataCharAC method), 8	InitACRecord () (in module PyGFETdb.DataStructures), 10
GetIrmsVds () (PyGFETdb.DataClass.DataCharAC method), 8	InitDCRecord () (in module PyGFETdb.DataStructures), 10
GetLength () (PyGFETdb.DataClass.DataCharDC method), 9	InitMenu () (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4
GetName () (PyGFETdb.DataClass.DataCharDC method), 9	InsertCharact () (PyGFETdb.DBCore.PyFETdb method), 7
GetNoA () (PyGFETdb.DataClass.DataCharAC method), 8	InsertGateCharact () (PyGFETdb.DBCore.PyFETdb method), 7
GetNoAIds2 () (PyGFETdb.DataClass.DataCharAC method), 8	
GetNoB () (PyGFETdb.DataClass.DataCharAC method), 8	InterpolatePSD () (in module PyGFETdb.AnalyzeData), 5

IntMethod (PyGFETdb.DataClass.DataCharDC attribute), 10

## L

line (PyGFETdb.PlotDataClass.PyFETPlotBase attribute), 12

lines (PyGFETdb.PlotDataClass.PyFETPlotBase attribute), 12

LoadDataFromFile() (in module PyGFETdb.DataStructures), 10

LogFnoise() (in module PyGFETdb.DataClass), 10

LogFnoise() (in module PyGFETdb.NoiseModel), 11

LstAreaChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstContactChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstCyChange() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp attribute), 5

LstDevicesChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstLChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstMasksChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstPassChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstSubstratesChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstTrtChange() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp method), 3

LstTypesChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

LstVdsChange() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp method), 3

LstVgsChange() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp method), 3

LstWafersChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 5

LstWChange() (PyGFETdb.GuiDBView.GuiDBView.DBViewApp method), 4

## M

main() (in module PyGFETdb.GuiDBView.GuiDBView), 5

mark (PyGFETdb.PlotDataClass.PyFETPlotBase attribute), 12

marks (PyGFETdb.PlotDataClass.PyFETPlotBase attribute), 12

MultiSelect() (PyGFETdb.DBCore.PyFETdb method), 7

MyCycle (class in PyGFETdb.PlotDataClass), 11

## N

NewRow() (PyGFETdb.DBCore.PyFETdb method), 7

next() (PyGFETdb.PlotDataClass.MyCycle method), 11

NextColor() (PyGFETdb.PlotDataClass.PyFETPlotBase method), 11

NextLine() (PyGFETdb.PlotDataClass.PyFETPlotBase method), 11

NextMark() (PyGFETdb.PlotDataClass.PyFETPlotBase method), 11

NFmin (PyGFETdb.DataClass.DataCharAC attribute), 8

NFmin (PyGFETdb.DataClass.DataCharAC attribute), 8

## O

OutFigFormats (PyGFETdb.GuiDBView.GuiDBView.DBViewApp attribute), 5

## P

Plot() (PyGFETdb.DataClass.PyFETPlotDataClass method), 10

Plot() (PyGFETdb.PlotDataClass.PyFETPlot method), 11

Plot() (PyGFETdb.PlotDataClass.PyFETPlotParam method), 12

PlotDataCh() (PyGFETdb.DataClass.PyFETPlotDataClass method), 10

PlotDataCh() (PyGFETdb.PlotDataClass.PyFETPlot method), 11

PlotDataSet() (PyGFETdb.DataClass.PyFETPlotDataClass method), 10

PlotDataSet() (PyGFETdb.PlotDataClass.PyFETPlot method), 11

PlotDataSet() (PyGFETdb.PlotDataClass.PyFETPlotParam method), 12

PlotGroupBy() (in module PyGFETdb.DBAnalyze), 6

PlotGroupBySearchAndGetParam() (in module PyGFETdb.DBAnalyze), 6

PlotMeanStd() (in module PyGFETdb.DBAnalyze), 6

PlotXYVars() (in module PyGFETdb.DBAnalyze), 6

PltVsVgsClick() (PyGFETdb.GuiDBView.GuiDBView.AppDataExp method), 3

PolyOrder (PyGFETdb.DataClass.DataCharDC attribute), 10

PrintQuery (PyGFETdb.DBCore.PyFETdb attribute), 7

PSDintegral() (in module PyGFETdb.NoiseModel), 11

PyFETdb (class in PyGFETdb.DBCore), 6

PyFETPlot (class in PyGFETdb.PlotDataClass), 11

PyFETPlotBase (class in PyGFETdb.PlotDataClass), 11

PyFETPlotDataClass (class *PyGFETdb.DataClass*), 10  
 PyFETPlotParam (class *PyGFETdb.PlotDataClass*), 12  
 PyGFETdb (module), 12  
 PyGFETdb.AnalyzeData (module), 5  
 PyGFETdb.DataClass (module), 8  
 PyGFETdb.DataStructures (module), 10  
 PyGFETdb.DB (module), 6  
 PyGFETdb.DBAnalyze (module), 6  
 PyGFETdb.DBCore (module), 6  
 PyGFETdb.DBSearch (module), 7  
 PyGFETdb.GuiDBView (module), 5  
 PyGFETdb.GuiDBView.GuiDBView (module), 3  
 PyGFETdb.NoiseModel (module), 10  
 PyGFETdb.PlotDataClass (module), 11

## R

RemoveOutliers () (in module *PyGFETdb.DBSearch*), 8  
 reset () (*PyGFETdb.PlotDataClass.MyCycle* method), 11

## S

SaveFigures () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 5  
 SearchAndGetParam () (in module *PyGFETdb.DBAnalyze*), 6  
 SearchAndPlot () (in module *PyGFETdb.DBAnalyze*), 6  
 SetAxesLabels () (*PyGFETdb.PlotDataClass.PyFETPlotBase* method), 12  
 SetAxesXLabels () (*PyGFETdb.PlotDataClass.PyFETPlotBase* method), 12  
 SetAxesXLabels () (*PyGFETdb.PlotDataClass.PyFETPlotParam* method), 12  
 setNColors () (*PyGFETdb.PlotDataClass.PyFETPlotBase* method), 12  
 staticMetaObject (*PyGFETdb.GuiDBView.GuiDBView.AppDataExp* attribute), 3  
 staticMetaObject (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 5

## T

TblACCellChanged () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 5  
 TblDCCellChanged () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 5  
 TblTrtsCellChanged () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 5

in TrtFields (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 5  
 in TrtSearchFields (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 5  
 TrtsUpdateFields (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 5

## U

UpdateCharTableField () (in module *PyGFETdb.DBSearch*), 8  
 UpdateData () (*PyGFETdb.DataClass.DataCharDC* method), 10  
 UpdatePltVsFreq () (*PyGFETdb.GuiDBView.GuiDBView.AppDataExp* method), 3  
 UpdateRow () (*PyGFETdb.DBCore.PyFETdb* method), 7  
 UpdateSearchList () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 5  
 UpdateWafersList () (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* method), 5

## V

ViewAxsAC (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 5  
 ViewAxsDC (*PyGFETdb.GuiDBView.GuiDBView.DBViewApp* attribute), 5

## X

xVarProp (*PyGFETdb.PlotDataClass.PyFETPlotParam* attribute), 12