Ordering number : EN7177B

CPH5905

ON Semiconductor®

http://onsemi.com

N-Channel JFET and NPN Bipolar Transistor

15V, 10 to 32mA, 50V, 150mA, Composite type, CPH5

Features

- Composite type with J-FET and NPN transistors contained in the CPH5 package, improving the mounting efficiency greatly
- The CPH5905 contains a 2SK3357-equivalent chip and a 2SC4639-equivalent chip in one package
- Drain and emitter are shared

Specifications

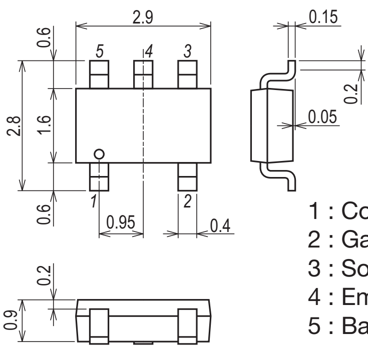
Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
[FET]				
Drain-to-Source Voltage	V_{DSX}		15	V
Gate-to-Drain Voltage	V_{GDS}		–15	V
Gate Current	I_G		10	mA
Drain Current	I_D		50	mA
Allowable Power Dissipation	P_D	Mounted on a ceramic board (600mm^2×0.8mm)	350	mW
[TR]				
Collector-to-Base Voltage	V_{CBO}		55	V
Collector-to-Emitter Voltage	V_{CEO}		50	V
Emitter-to-Base Voltage	V_{EBO}		6	V
Collector Current	I_C		150	mA
Collector Current (Pulse)	I_{CP}		300	mA
Base Current	I_B		30	mA
Collector Dissipation	P_C	Mounted on a ceramic board (600mm^2×0.8mm)	350	mW
[TR]				
Total Power Dissipation	P_T	Mounted on a ceramic board (600mm^2×0.8mm)	500	mW
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Package Dimensions

unit : mm (typ)
7017A-007



CPH5905G-TL-E
CPH5905H-TL-E

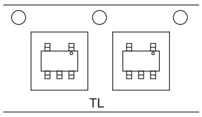
1 : Collector
2 : Gate
3 : Source
4 : Emitter/Drain
5 : Base

CPH5

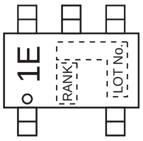
Product & Package Information

• Package	: CPH5
• JEITA, JEDEC	: SC-74A, SOT-25
• Minimum Packing Quantity	: 3,000 pcs./reel

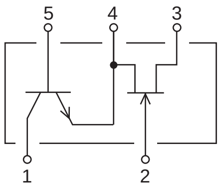
Packing Type : TL



Marking



Electrical Connection



August, 2013

Electrical Characteristics at Ta=25°C

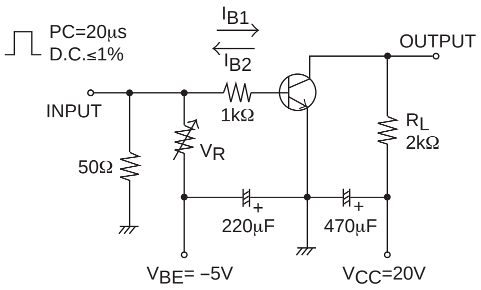
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[FET]						
Gate-to-Drain Breakdown Voltage	$V_{(BR)GDS}$	I_G=−10μA, V_{GS}=0V	−15			V
Gate Cutoff Current	I_{GSS}	V_{GS}=−10V, V_{DS}=0V			−1.0	nA
Cutoff Voltage	V_{GS}(off)	V_{DS}=5V, I_D=100μA	−0.4	−0.7	−1.5	V
Drain Current	I_{DSS}	V_{DS}=5V, V_{GS}=0V	10.0*		32.0*	mA
Forward Transfer Admittance	| yfs |	V_{DS}=5V, V_{GS}=0V, f=1kHz	24	35		mS
Input Capacitance	Ciss	V_{DS}=5V, V_{GS}=0V, f=1kHz		10.0		pF
Reverse Transfer Capacitance	Crss	V_{DS}=5V, V_{GS}=0V, f=1kHzz		2.9		pF
Noise Figure	NF	V_{DS}=5V, Rg=1kΩ, I_D=1mA, f=1kHz		1.0		dB
[TR]						
Collector Cutoff Current	I_{CBO}	V_{CB}=35V, I_E=0A			0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=4V, I_C=0A			0.1	μA
DC Current Gain	h_{FE}	V_{CE}=6V, I_C=1mA	135		400	
Gain-Bandwidth Product	f_T	V_{CE}=6V, I_C=10mA		200		MHz
Output Capacitance	Cob	V_{CB}=6V, f=1MHz		1.7		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=50mA, I_B=5mA		0.08	0.4	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=50mA, I_B=5mA		0.8	1.0	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=10μA, I_E=0A	55			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=1mA, R_{BE}=∞	50			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=10μA, I_C=0A	6			V
Turn-On Time	t_{on}	See specified Test Circuit.		0.15		ns
Storage Time	t_{stg}			0.75		ns
Fall Time	t_f			0.20		ns

* : The CPH5905 is classified by I_{DSS} as follows : (unit : mA)

Rank	G	H
I_{DSS}	10.0 to 20.0	16.0 to 32.0

The specifications shown above are for each individual FET or transistor.

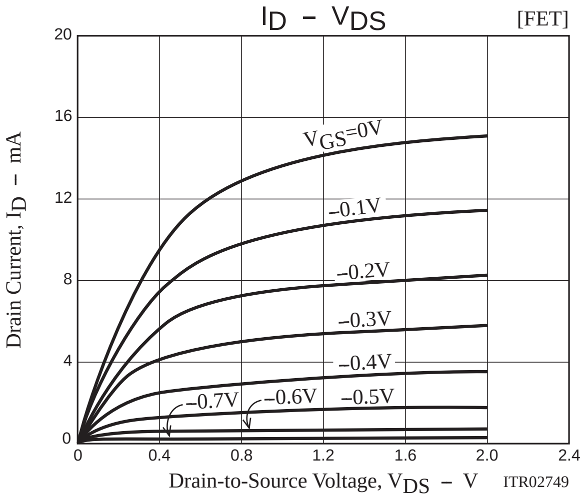
Switching Time Test Circuit

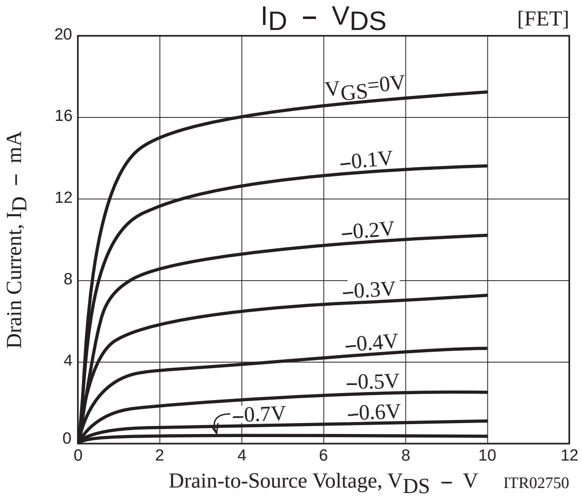


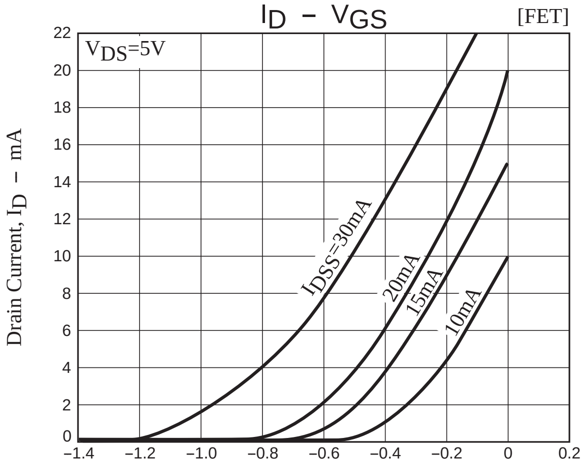
$10I_{B1}= -10I_{B2}=I_C$=10mA

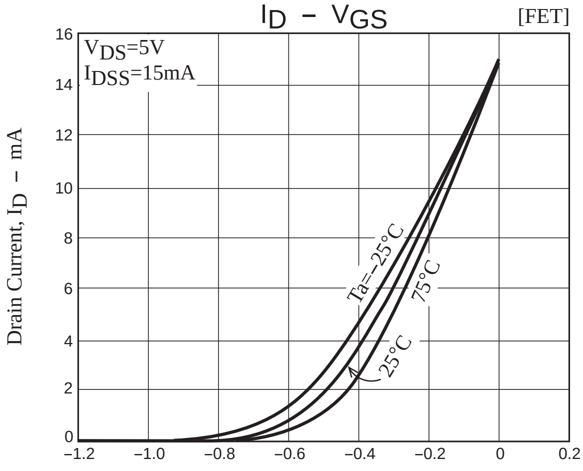
Ordering Information

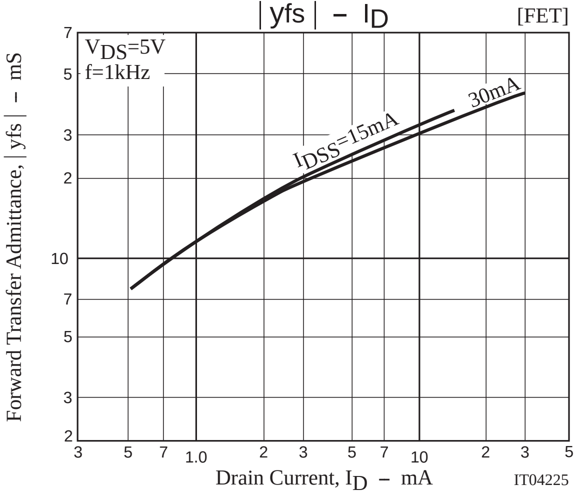
Device	Package	Shipping	memo
CPH5905G-TL-E	CPH5	3,000pcs./reel	Pb Free
CPH5905H-TL-E	CPH5	3,000pcs./reel	

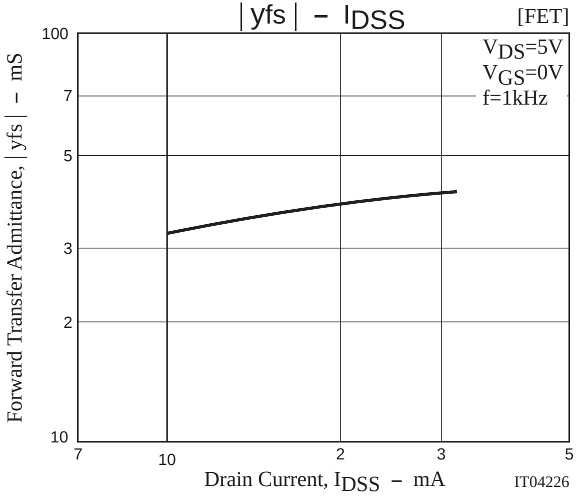

I_D – V_{DS}
[FET]
Drain Current, I_D – mA
Drain-to-Source Voltage, V_{DS} – V
ITR02749
0
4
8
12
16
20
0
0.4
0.8
1.2
1.6
2.0
2.4
V_{GS}=0V
–0.1V
–0.2V
–0.3V
–0.4V
–0.5V
–0.6V
–0.7V

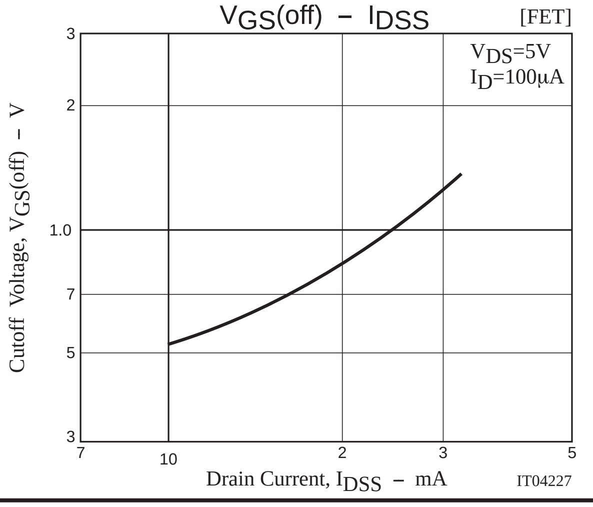

I_D – V_{DS}
[FET]
Drain Current, I_D – mA
Drain-to-Source Voltage, V_{DS} – V
ITR02750
0
4
8
12
16
20
0
2
4
6
8
10
12
V_{GS}=0V
–0.1V
–0.2V
–0.3V
–0.4V
–0.5V
–0.6V
–0.7V

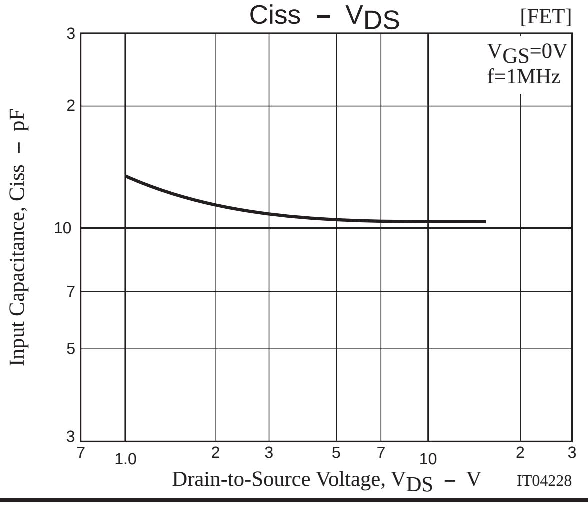

I_D – V_{GS}
[FET]
Drain Current, I_D – mA
Gate-to-Source Voltage, V_{GS} – V
IT04224
V_{DS}=5V
0
2
4
6
8
10
12
14
16
18
20
22
–1.4
–1.2
–1.0
–0.8
–0.6
–0.4
–0.2
0
0.2
I_{DSS}=30mA
20mA
15mA
10mA

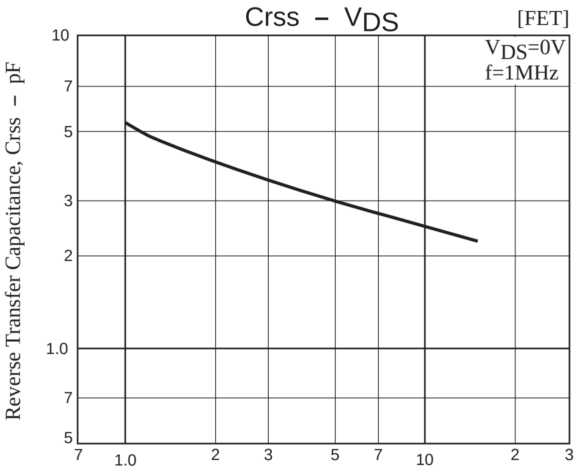

I_D – V_{GS}
[FET]
Drain Current, I_D – mA
Gate-to-Source Voltage, V_{GS} – V
ITR02752
V_{DS}=5V
I_{DSS}=15mA
0
2
4
6
8
10
12
14
16
–1.2
–1.0
–0.8
–0.6
–0.4
–0.2
0
0.2
Ta=–25°C
75°C
25°C

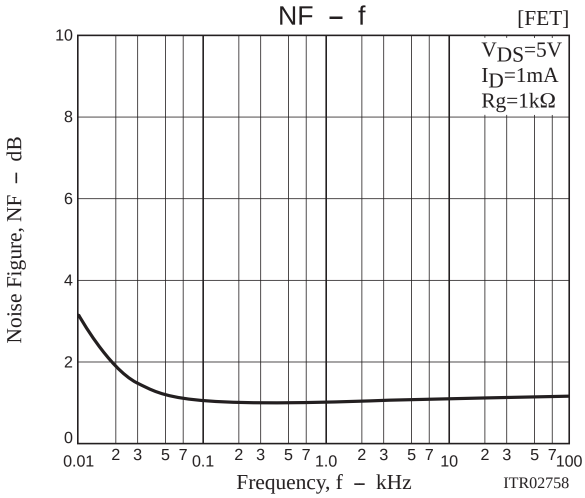

| yfs | – I_D
[FET]
Forward Transfer Admittance, | yfs | – mS
Drain Current, I_D – mA
IT04225
V_{DS}=5V
f=1kHz
2
3
5
7
10
2
3
5
7
3
5
7
1.0
2
3
5
7
10
2
3
5
I_{DSS}=15mA
30mA

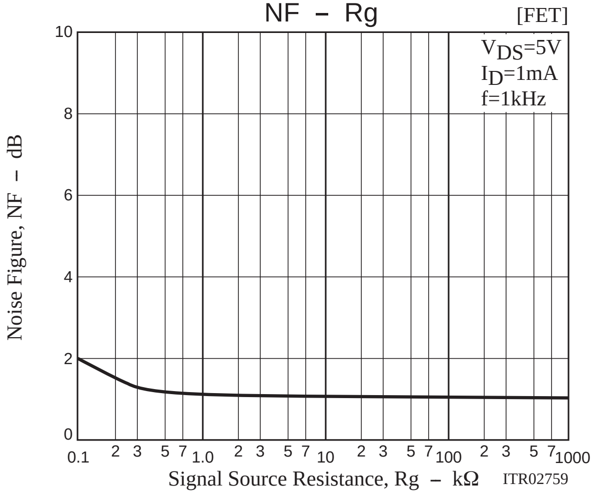

| yfs | – I_{DSS}
[FET]
Forward Transfer Admittance, | yfs | – mS
Drain Current, I_{DSS} – mA
IT04226
V_{DS}=5V
V_{GS}=0V
f=1kHz
10
2
3
5
7
100
7
10
2
3
5

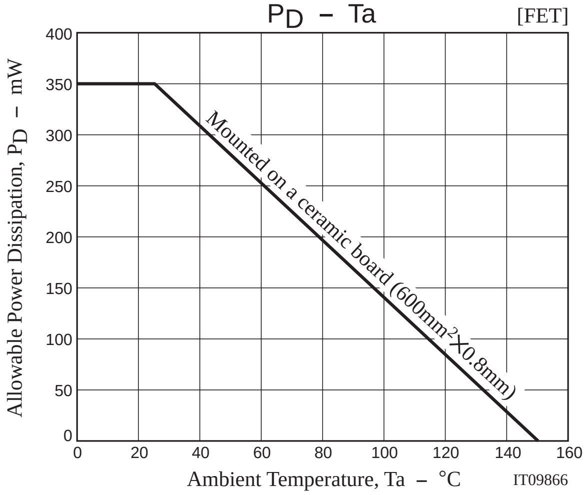

V_{GS}(off) – I_{DSS}
[FET]
Cutoff Voltage, V_{GS}(off) – V
Drain Current, I_{DSS} – mA
IT04227
V_{DS}=5V
I_D=100µA
3
5
7
1.0
2
3
7
10
2
3
5

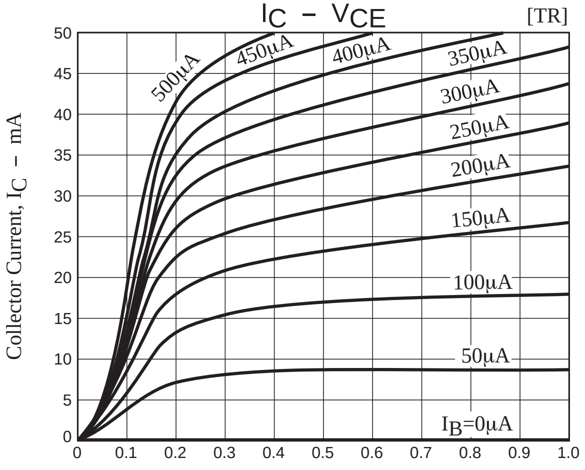

Ciss – V_{DS}
[FET]
Input Capacitance, Ciss – pF
Drain-to-Source Voltage, V_{DS} – V
IT04228
V_{GS}=0V
f=1MHz
3
5
7
10
2
3
7
1.0
2
3
5
7
10
2
3

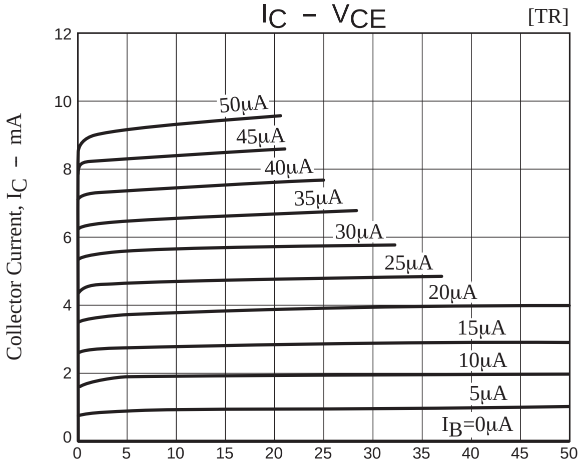

Crss – VDS
[FET]
VDS=0V
f=1MHz
Reverse Transfer Capacitance, Crss – pF
10
7
5
3
2
1.0
7
5
7
1.0
2
3
5
7
10
2
3
Drain-to-Source Voltage, VDS – V
IT04229

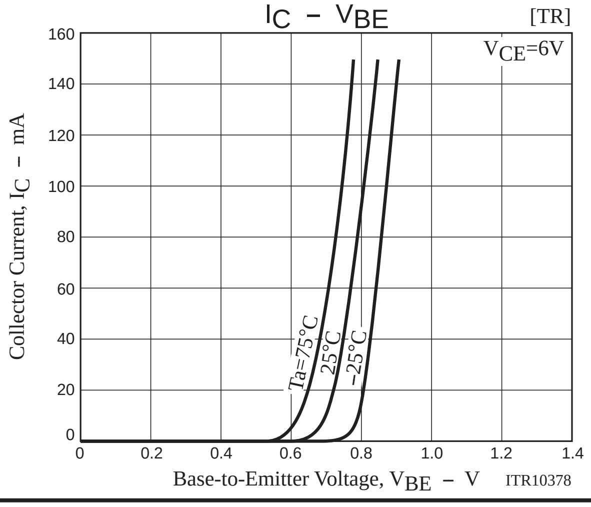

NF – f
[FET]
VDS=5V
ID=1mA
Rg=1kΩ
Noise Figure, NF – dB
10
8
6
4
2
0
0.01
2
3
5
7
0.1
2
3
5
7
1.0
2
3
5
7
10
2
3
5
7
100
Frequency, f – kHz
ITR02758

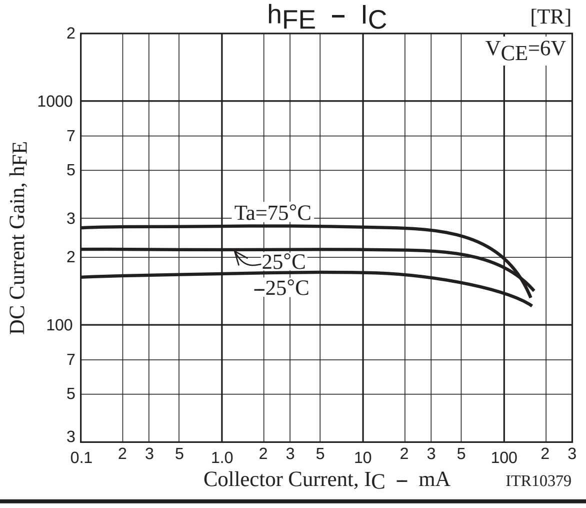

NF – Rg
[FET]
VDS=5V
ID=1mA
f=1kHz
Noise Figure, NF – dB
10
8
6
4
2
0
0.1
2
3
5
7
1.0
2
3
5
7
10
2
3
5
7
100
2
3
5
7
1000
Signal Source Resistance, Rg – kΩ
ITR02759

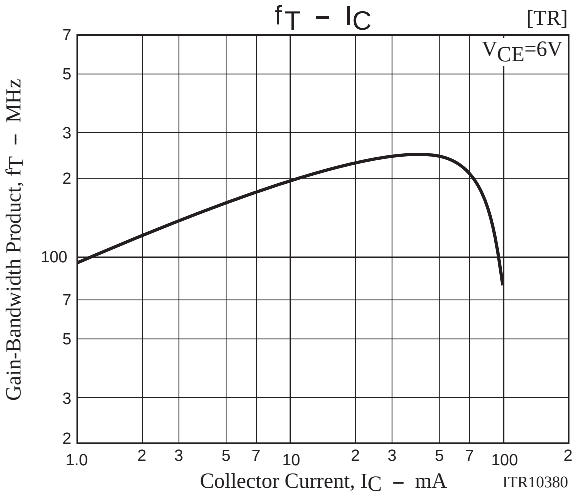

PD – Ta
[FET]
Mounted on a ceramic board (600mm²✕0.8mm)
Allowable Power Dissipation, PD – mW
400
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
Ambient Temperature, Ta – °C
IT09866

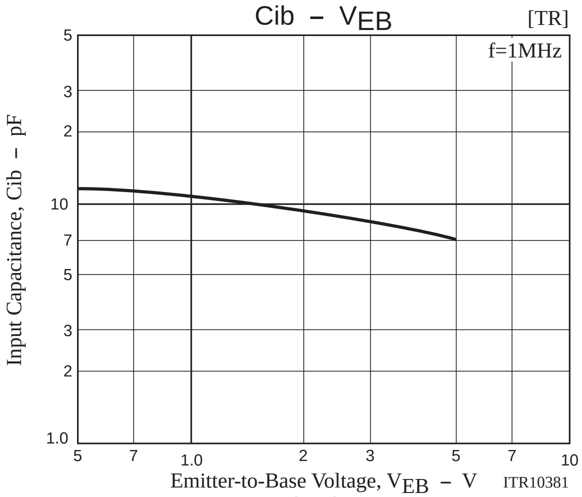

IC – VCE
[TR]
500μA
450μA
400μA
350μA
300μA
250μA
200μA
150μA
100μA
50μA
IB=0μA
Collector Current, IC – mA
50
45
40
35
30
25
20
15
10
5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Collector-to-Emitter Voltage, VCE – V
ITR10376

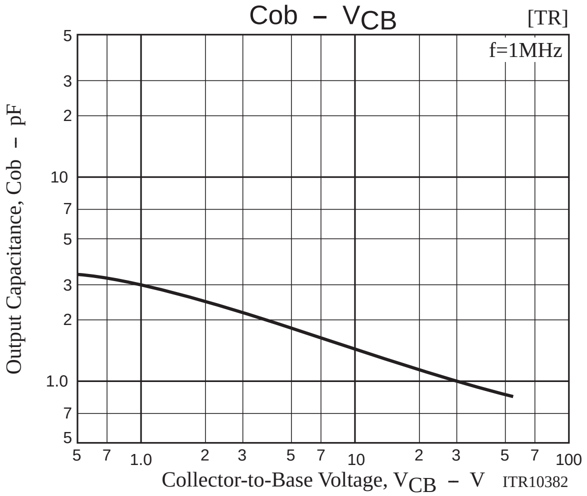

IC – VCE
[TR]
50μA
45μA
40μA
35μA
30μA
25μA
20μA
15μA
10μA
5μA
IB=0μA
Collector Current, IC – mA
12
10
8
6
4
2
0
0
5
10
15
20
25
30
35
40
45
50
Collector-to-Emitter Voltage, VCE – V
ITR10377

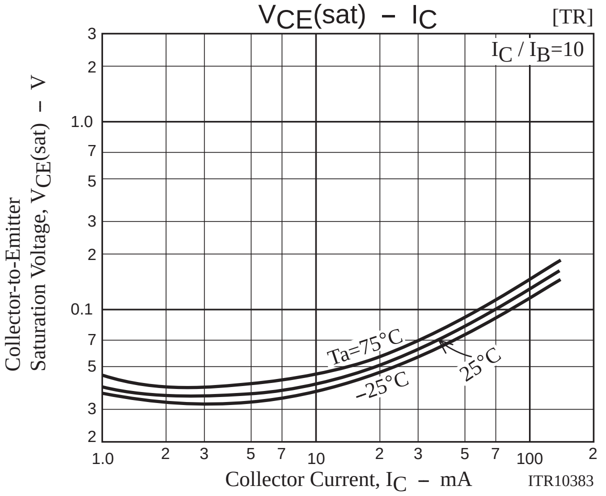

IC – VBE
[TR]
VCE=6V
Ta=75°C
25°C
–25°C
Collector Current, IC – mA
160
140
120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Base-to-Emitter Voltage, VBE – V
ITR10378

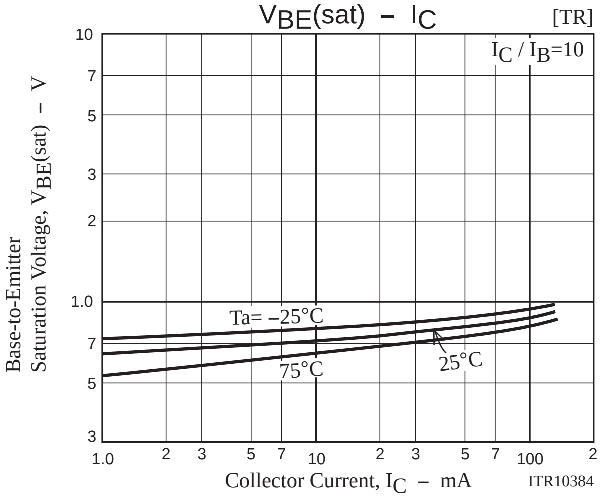

hFE – IC
[TR]
VCE=6V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
2
1000
7
5
3
2
100
7
5
3
0.1
2
3
5
1.0
2
3
5
10
2
3
5
100
2
3
Collector Current, IC – mA
ITR10379

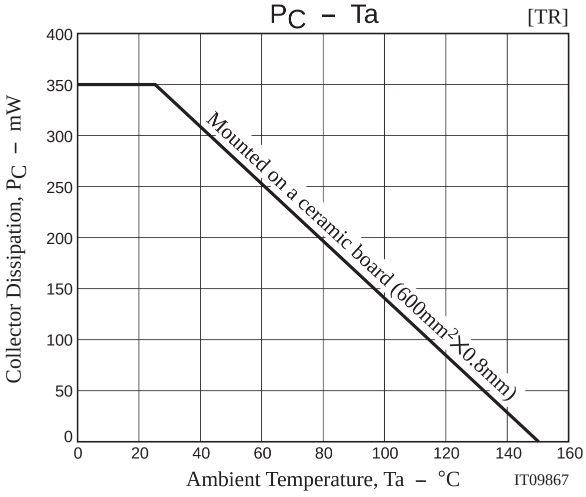

fT – IC
[TR]
VCE=6V
Gain-Bandwidth Product, fT – MHz
7
5
3
2
100
7
5
3
2
1.0
2
3
5
7
10
2
3
5
7
100
2
Collector Current, IC – mA
ITR10380


Cib – VEB
[TR]
f=1MHz
Input Capacitance, Cib – pF
5
3
2
10
7
5
3
2
1.0
5
7
1.0
2
3
5
7
10
Emitter-to-Base Voltage, VEB – V
ITR10381


Cob – VCB
[TR]
f=1MHz
Output Capacitance, Cob – pF
5
3
2
10
7
5
3
2
1.0
7
5
5
7
1.0
2
3
5
7
10
2
3
5
7
100
Collector-to-Base Voltage, VCB – V
ITR10382


VCE(sat) – IC
[TR]
IC / IB=10
Collector-to-Emitter
Saturation Voltage, VCE(sat) – V
3
2
1.0
7
5
3
2
0.1
7
5
3
2
Ta=75°C
–25°C
25°C
1.0
2
3
5
7
10
2
3
5
7
100
2
Collector Current, IC – mA
ITR10383


VBE(sat) – IC
[TR]
IC / IB=10
Base-to-Emitter
Saturation Voltage, VBE(sat) – V
10
7
5
3
2
1.0
7
5
3
Ta= –25°C
75°C
25°C
1.0
2
3
5
7
10
2
3
5
7
100
2
Collector Current, IC – mA
ITR10384


PC – Ta
[TR]
Collector Dissipation, PC – mW
400
350
300
250
200
150
100
50
0
Mounted on a ceramic board (600mm²×0.8mm)
0
20
40
60
80
100
120
140
160
Ambient Temperature, Ta – °C
IT09867

Embossed Taping Specification

CPH5905G-TL-E, CPH5905H-TL-E

1. Packing Format

Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
CPH5	CPH6	3,000	15,000	90,000	5 reels contained Dimensions:mm(external) 183×72×185	6 inner boxes contained Dimensions:mm(external) 440×195×210

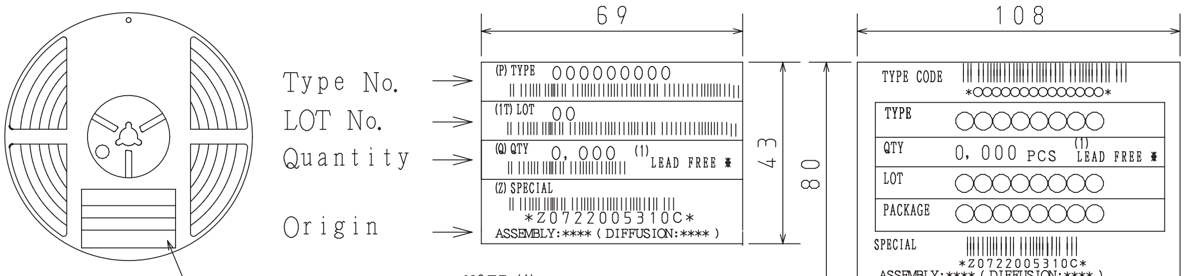
Packing method

Reel label, Inner box label

(unit:mm)

Outer box label

It is a label at the time of factory shipments. The form of a label may change in physical distribution process.

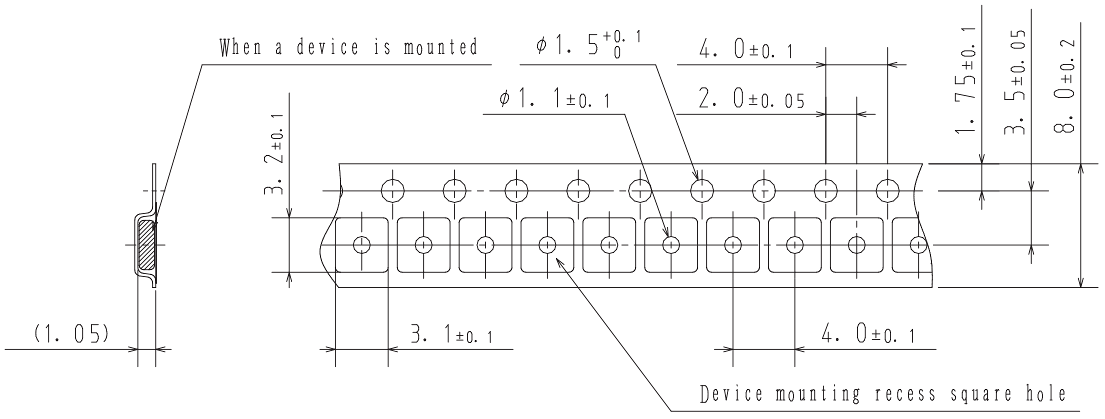


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

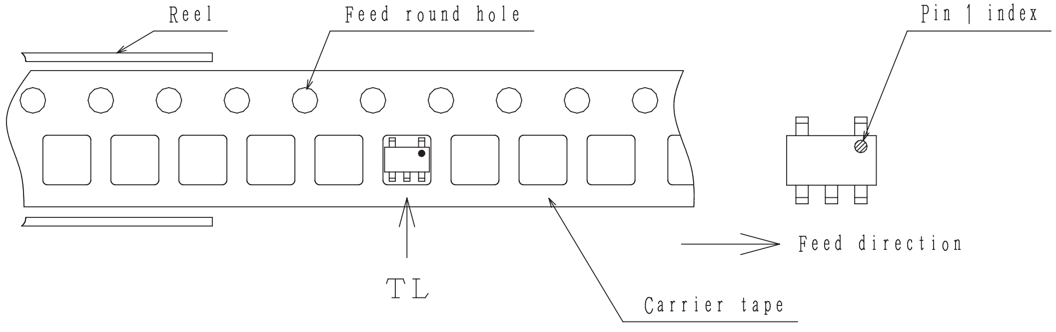
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

2. Taping configuration

2-1. Carrier tape size (unit:mm)



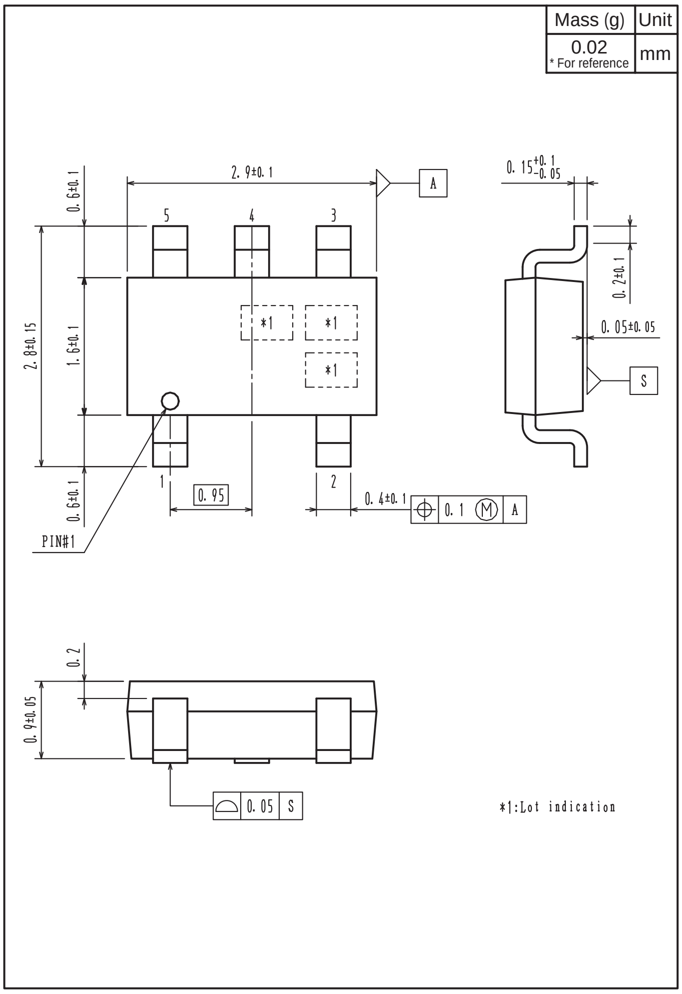
2-2. Device placement direction



Those with pin 1 index on the feed hole side……TL

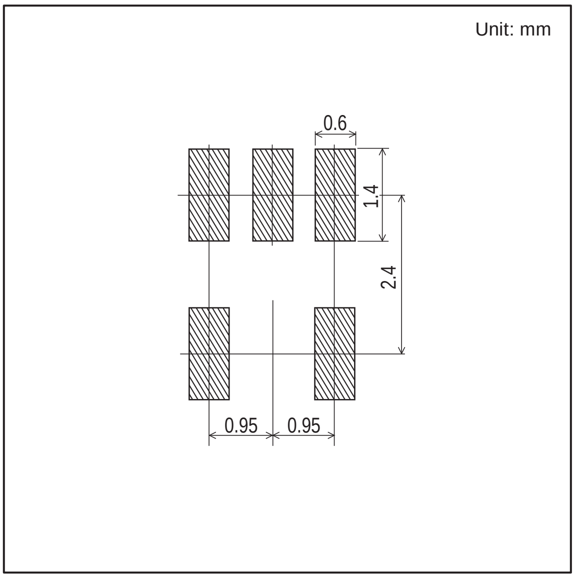
Outline Drawing

CPH5905G-TL-E, CPH5905H-TL-E



Mass (g)	Unit
0.02 * For reference	mm

Land Pattern Example



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