CPH3456

Power MOSFET
20V, 71mΩ, 3.5A, Single N-Channel

ON Semiconductor®

www.onsemi.com

V_{DSS}	R_{DS}(on) Max	I_D Max
20V	71 mΩ@4.5V	3.5A
	103 mΩ@2.5V	
	156 mΩ@1.8V	

Features

- ON-Resistance R_{DS}(on)1=54mΩ (typ)
- 1.8V Drive
- Pb-Free, Halogen Free and RoHS Compliance

Specifications

Absolute Maximum Ratings at Ta = 25°C

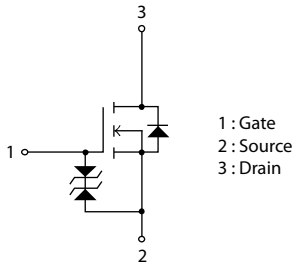
Parameter	Symbol	Value	Unit
Drain to Source Voltage	V_{DSS}	20	V
Gate to Source Voltage	V_{GSS}	±12	V
Drain Current (DC)	I_D	3.5	A
Drain Current (Pulse) PW≤10μs, duty cycle≤1%	I_{DP}	14	A
Power Dissipation When mounted on ceramic substrate (900mm^2×0.8mm)	P_D	1.0	W
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	–55 to +150	°C

This product is designed to "ESD immunity < 200V*", so please take care when handling.
* Machine Model

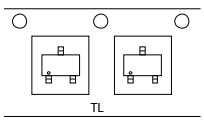
Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction to Ambient When mounted on ceramic substrate (900mm^2×0.8mm)	$R_{\theta JA}$	125	°C/W

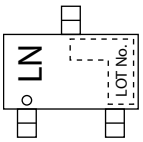
Electrical Connection
N-Channel



Packing Type:TL



Marking



Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

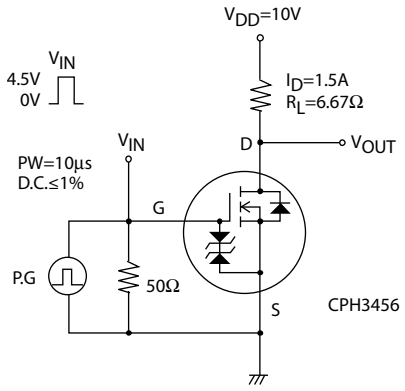
ORDERING INFORMATION
See detailed ordering and shipping information on page 5 of this data sheet.

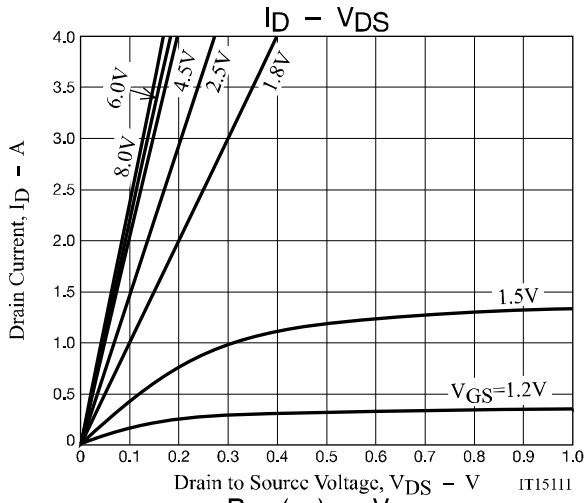
Electrical Characteristics at Ta = 25°C

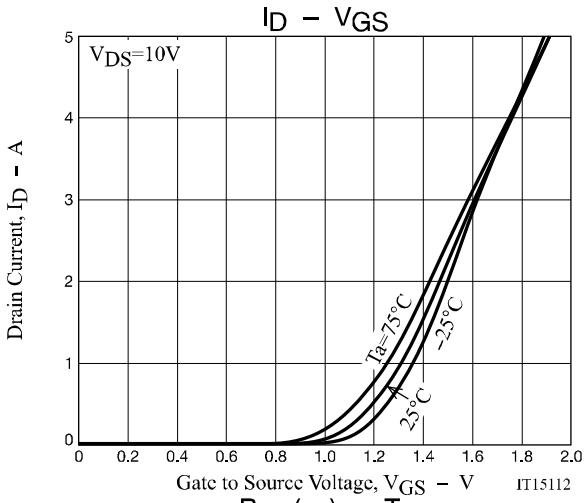
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=1mA, V_{GS}=0V	20			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V			1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V			±10	μA
Gate Threshold Voltage	$V_{GS}(th)$	V_{DS}=10V, I_D=1mA	0.4		1.3	V
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=1.5A		2.8		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=1.5A, V_{GS}=4.5V		54	71	mΩ
	$R_{DS}(on)2$	I_D=1A, V_{GS}=2.5V		73	103	mΩ
	$R_{DS}(on)3$	I_D=0.5A, V_{GS}=1.8V		104	156	mΩ
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		260		pF
Output Capacitance	Coss			65		pF
Reverse Transfer Capacitance	Crss			50		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit		6.2		ns
Rise Time	t_r			19		ns
Turn-OFF Delay Time	$t_d(off)$			30		ns
Fall Time	t_f			28		ns
Total Gate Charge	Qg	V_{DS}=10V, V_{GS}=4.5V, I_D=3.5A		2.8		nC
Gate to Source Charge	Qgs			0.6		nC
Gate to Drain “Miller” Charge	Qgd			0.9		nC
Forward Diode Voltage	V_{SD}	I_S=3.5A, V_{GS}=0V		0.85	1.2	V

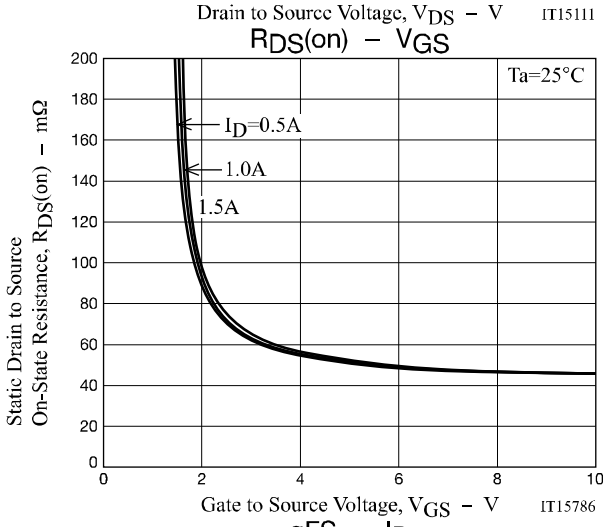
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

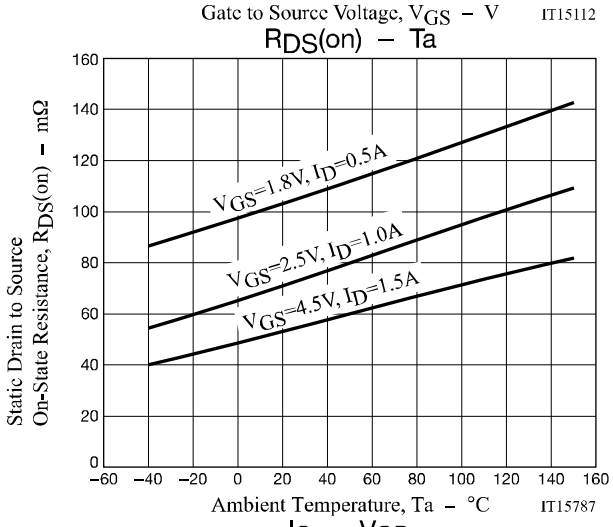
Switching Time Test Circuit

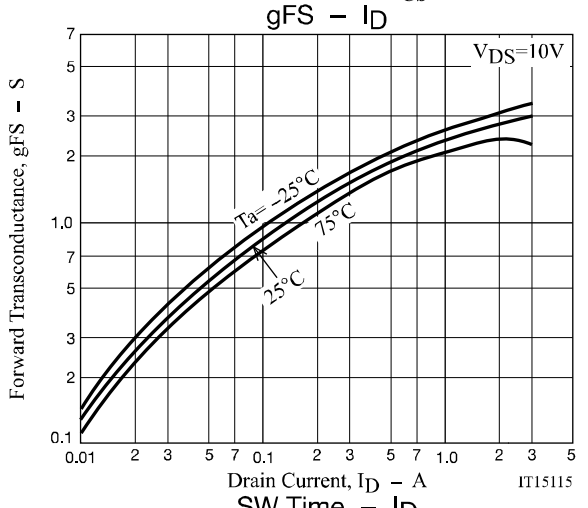


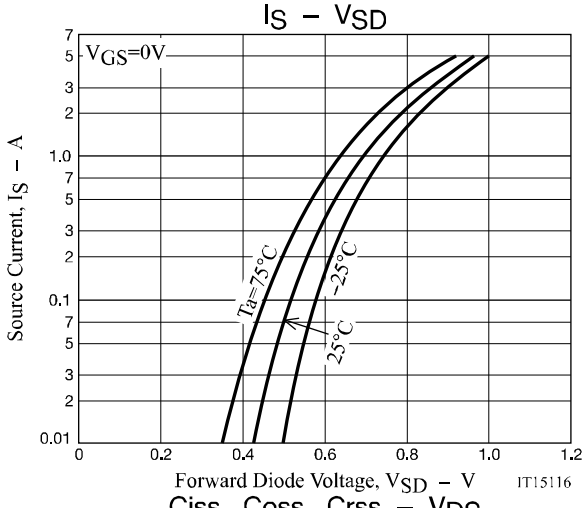

ID – VDS
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT15111
6.0V
8.0V
4.5V
2.5V
1.8V
1.5V
VGS=1.2V

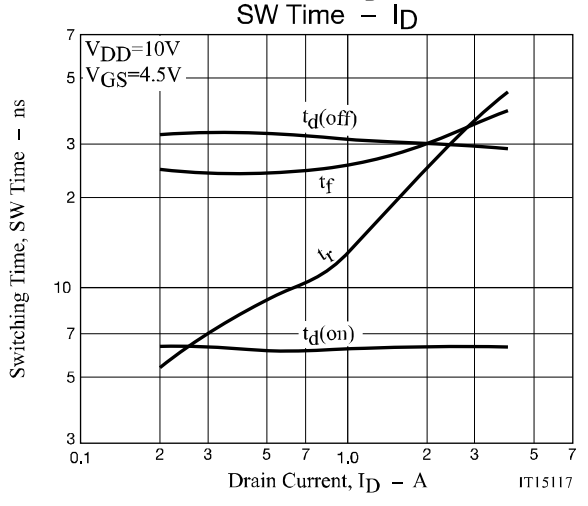

ID – VGS
VDS=10V
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT15112
Ta=75°C
–25°C
25°C

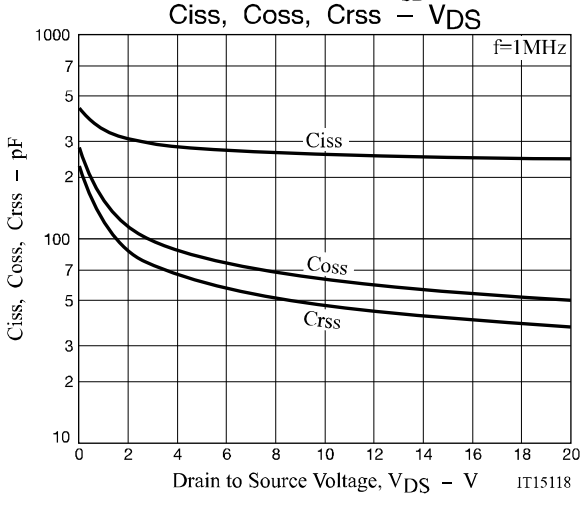

RDS(on) – VGS
Ta=25°C
ID=0.5A
1.0A
1.5A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT15786

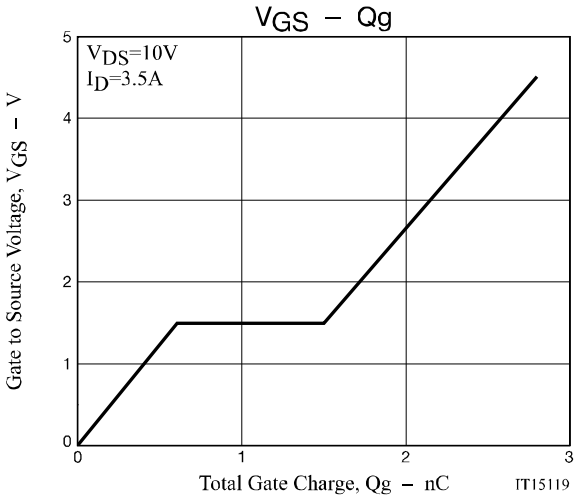

RDS(on) – Ta
VGS=1.8V, ID=0.5A
VGS=2.5V, ID=1.0A
VGS=4.5V, ID=1.5A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT15787

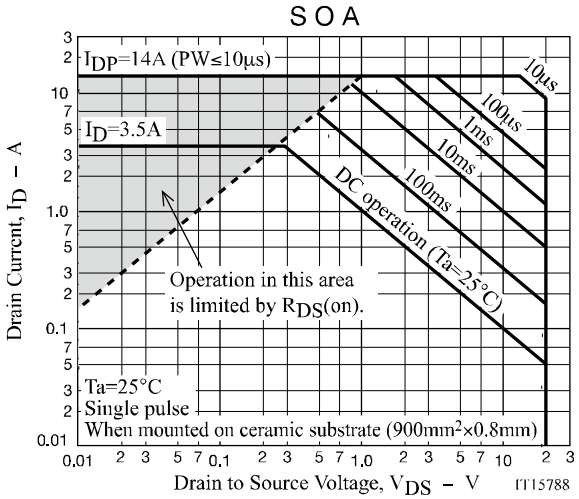

gFS – ID
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transconductance, gFS – S
Drain Current, ID – A
IT15115

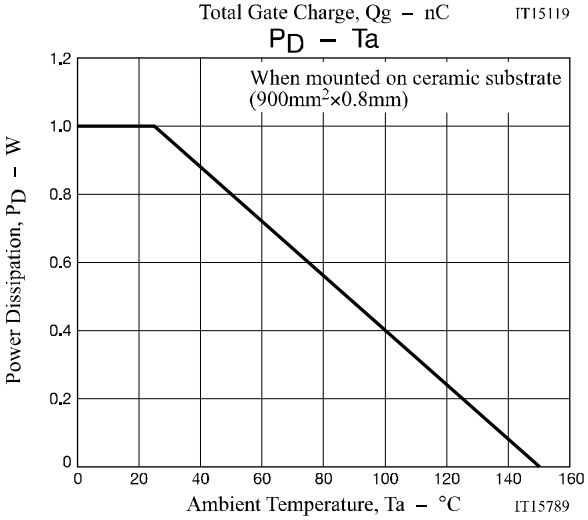

IS – VSD
VGS=0V
Ta=75°C
–25°C
25°C
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT15116

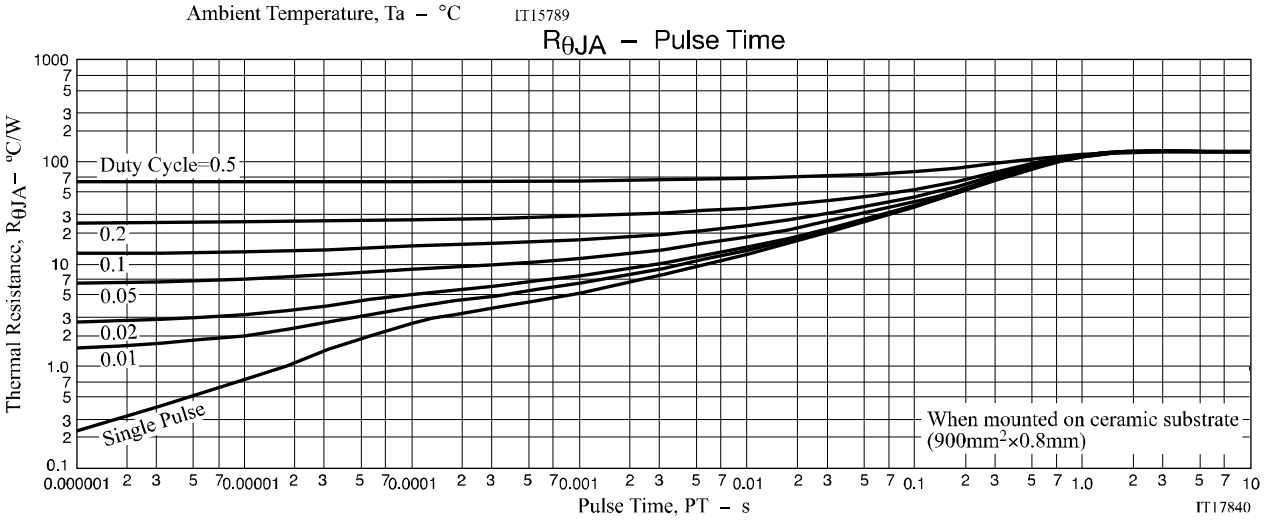

SW Time – ID
VDD=10V
VGS=4.5V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT15117


Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT15118


VGS – Qg
VDS=10V
ID=3.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT15119


S O A
IDP=14A (PW≤10μs)
ID=3.5A
10μs
100μs
1ms
10ms
100ms
DC operation (Ta=25°C)
Operation in this area
is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm2×0.8mm)
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT15788


PD – Ta
When mounted on ceramic substrate
(900mm2×0.8mm)
Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT15789


RθJA – Pulse Time
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(900mm2×0.8mm)
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17840

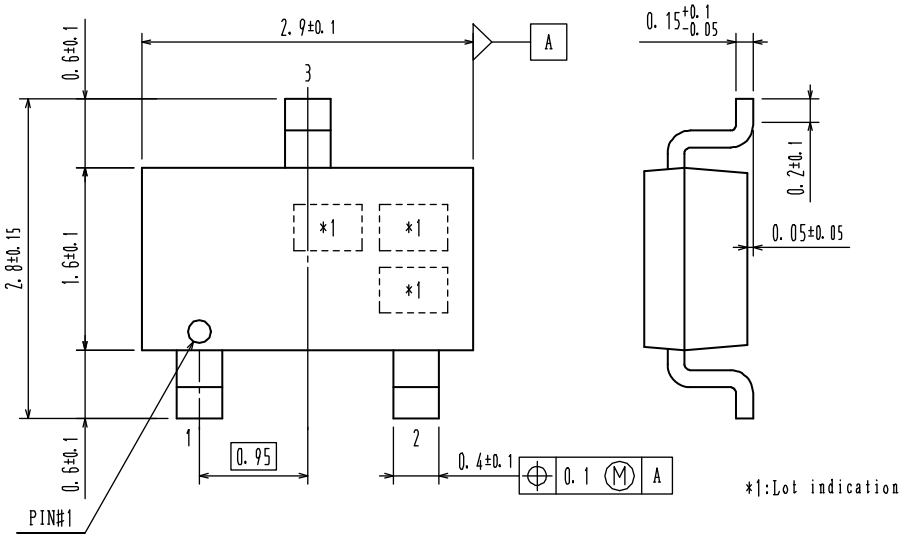
Package Dimensions

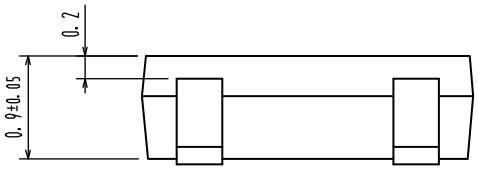
CPH3456-TL-H/ CPH3456-TL-W

CPH3
CASE 318BA
ISSUE O

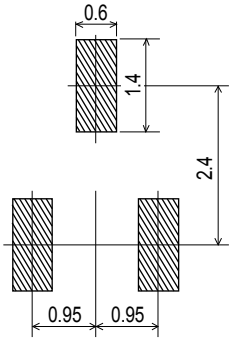
Unit : mm

1 : Gate
2 : Source
3 : Drain





Recommended Soldering Footprint



ORDERING INFORMATION

Device	Package	Shipping	Note
CPH3456-TL-H	CPH3, SC-59 SOT-23, TO-236	3,000 pcs. / reel	Pb-Free and Halogen Free
CPH3456-TL-W			

Note on usage : Since the CPH3456 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.