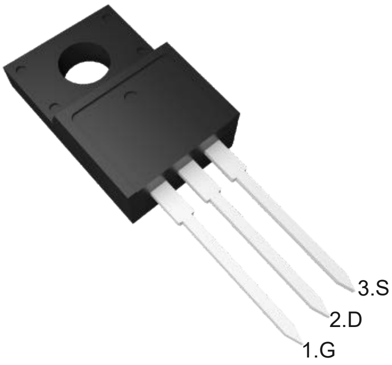
TN65H12NTF
N-Channel Enhancement Mode Power MOSFET

Features

- Fast Switching
- Low Reverse transfer capacitances
- Low gate charge and low $R_{DS(on)}$
- V_{DS}= 650V,I_D= 12A
  $R_{DS(on)}$< 0.65Ω @V_{GS}= 10V

TO-220F

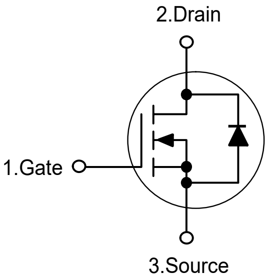


1.Gate 2.Drain 3.Source

Applications

- Power switch circuit of adaptor and charger

Schematic diagram



Absolute Maximum Ratings

Ratings at 25°C case temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Drain Current-Continuous	I_D	12	A
Drain Current-Pulsed Note1	I_{DM}	48	A
Single pulse avalanche energy Note4	E_{AS}	550	mJ
Maximum Power Dissipation	P_D	55	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient Note2	$R_{\theta JA}$	62.5	°C/W
Maximum Junction-to-Case Note2	$R_{\theta JC}$	2.98	°C/W

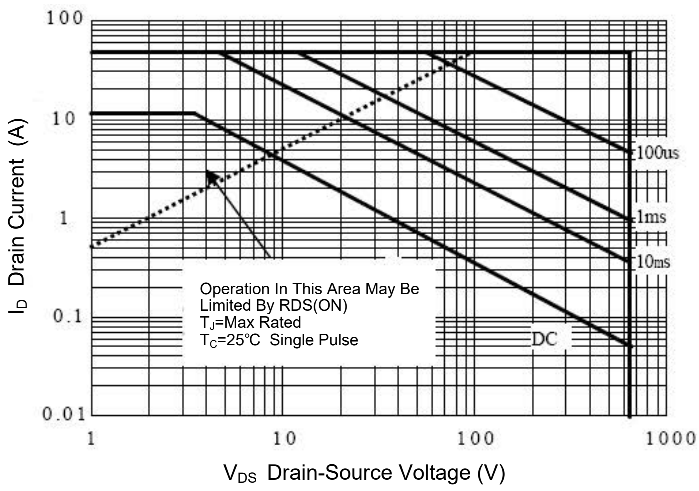
Electrical Characteristics

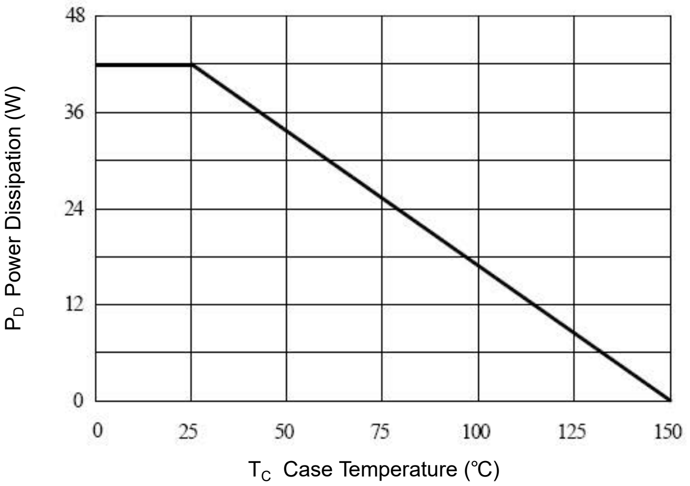
(Ta=25℃ unless otherwise specified)

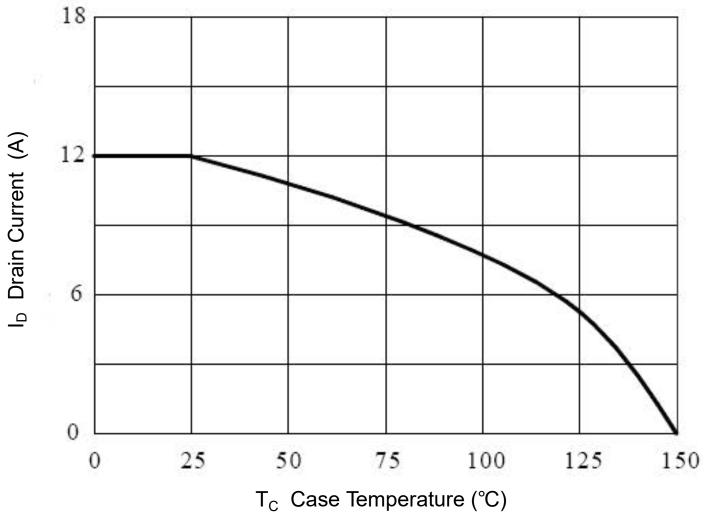
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250μA	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V	--	--	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±30V,V_{DS}=0V	--	--	±100	nA
Gate Threshold Voltage Note3	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	--	4	V
Drain-Source On-Resistance Note3	$R_{DS(on)}$	V_{GS}=10V,I_D=6A	--	0.58	0.65	Ω
Forward Transconductance Note3	g_{FS}	V_{DS}=15V,I_D=6A	--	12	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V,f=1MHz	--	1993	--	pF
Output Capacitance	C_{oss}		--	160	--	pF
Reverse Transfer Capacitance	C_{rss}		--	9.5	--	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=325V, I_D=12A, V_{GS}=10V,R_G=10Ω	--	28	--	nS
Turn-on Rise Time	t_r		--	26	--	nS
Turn-off Delay Time	$t_{d(off)}$		--	64	--	nS
Turn-off Fall Time	t_f		--	45	--	nS
Total Gate Charge	Q_g	V_{DD}=325V,I_D=12A, V_{GS}=10V	--	34	--	nC
Gate-Source Charge	Q_{gs}		--	10	--	nC
Gate-Drain Charge	Q_{gd}		--	14	--	nC
Source-Drain Diode Characteristics						
Diode Forward Voltage Note3	V_{SD}	V_{GS}=0V,I_S=12A	--	--	1.5	V
Diode Forward Current Note2	I_S		--	--	12	A

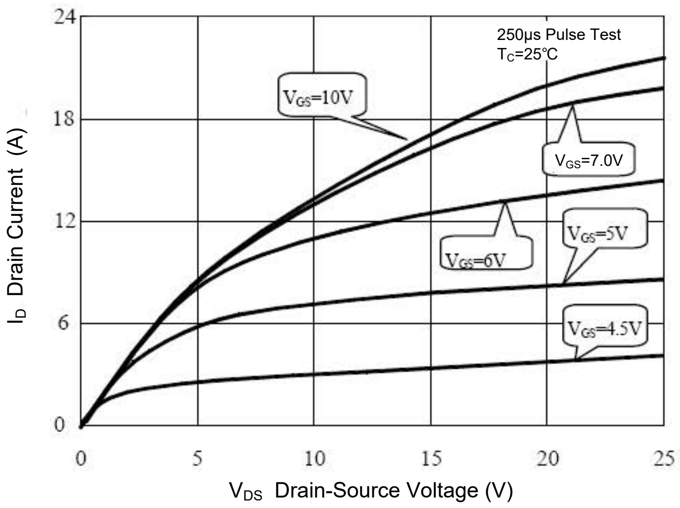
Note:
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse width<300μs, duty cycle<2%.
4. E_{AS} Condition:L=10mH, I_D=11.8A, start T_J=25°C.

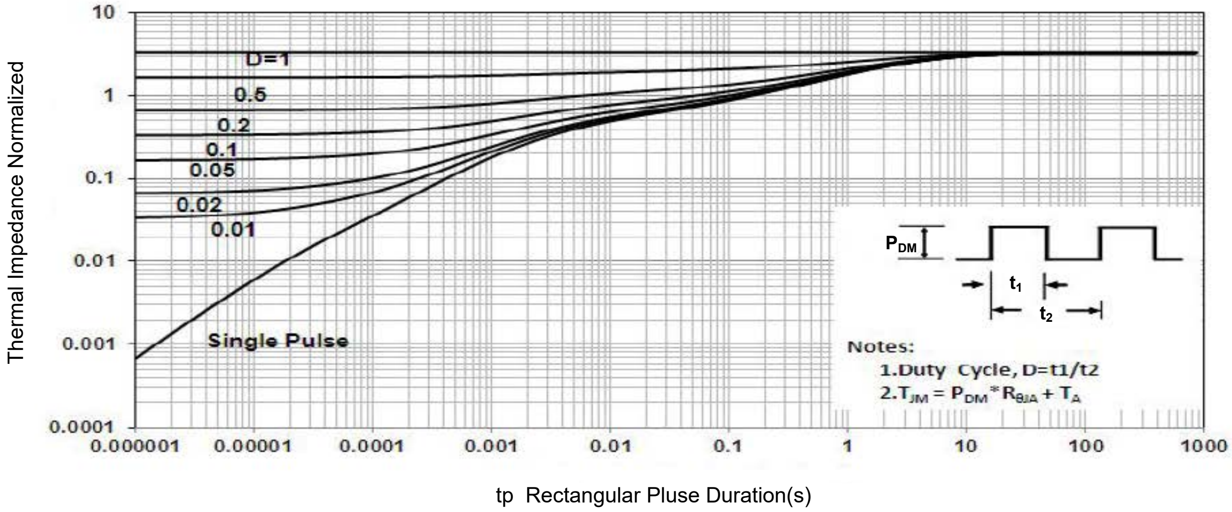
Typical Characteristic Curves

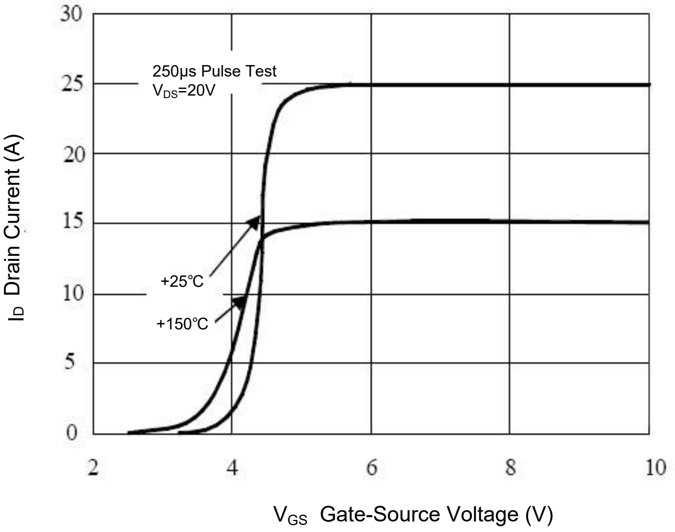


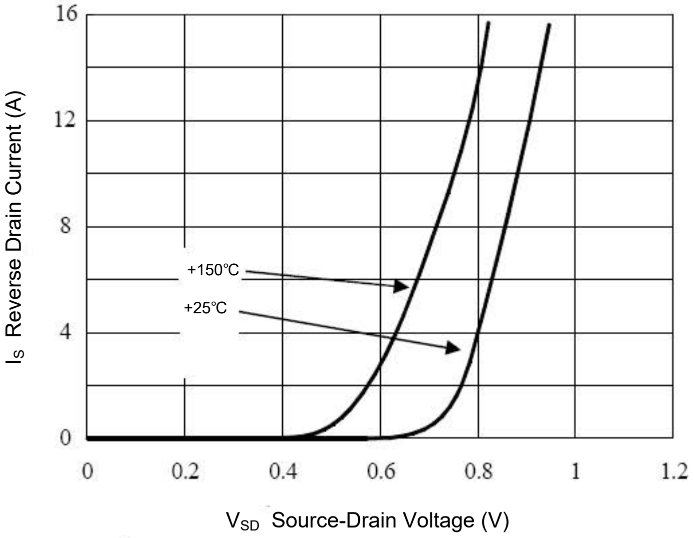


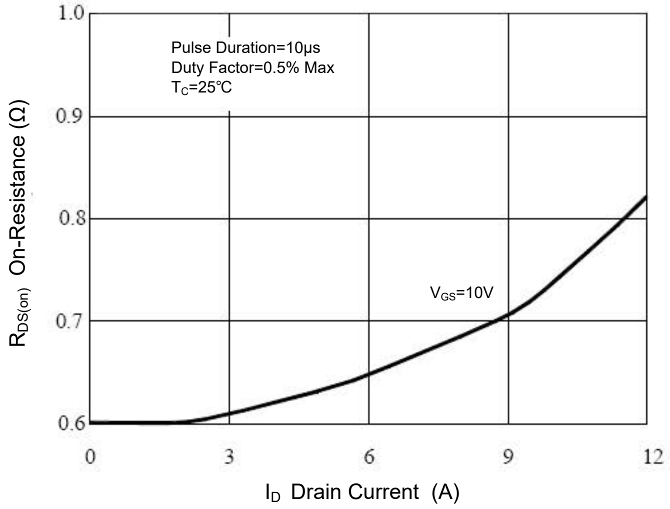


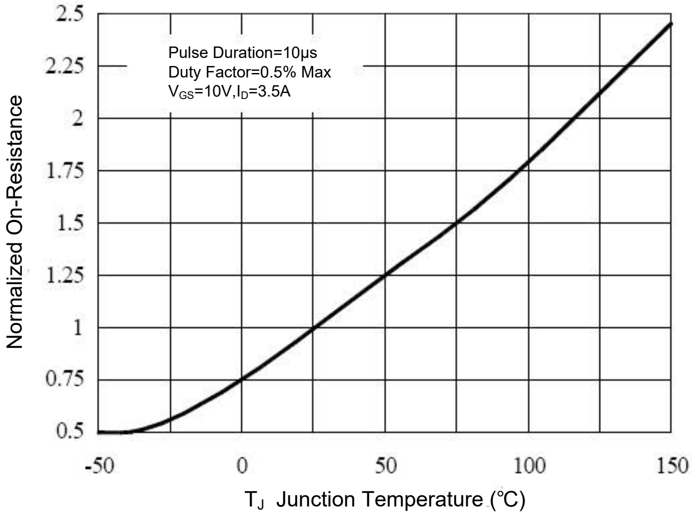


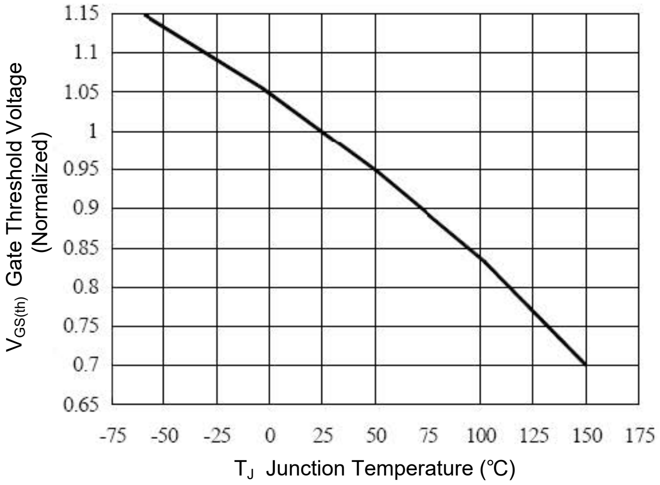


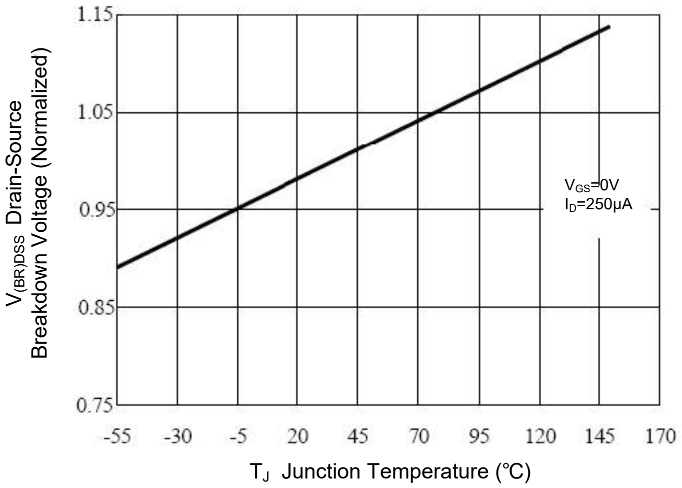

250µs Pulse Test
V_{DS}=20V
+25℃
+150℃
I_D Drain Current (A)
V_{GS} Gate-Source Voltage (V)
0
5
10
15
20
25
30
2
4
6
8
10

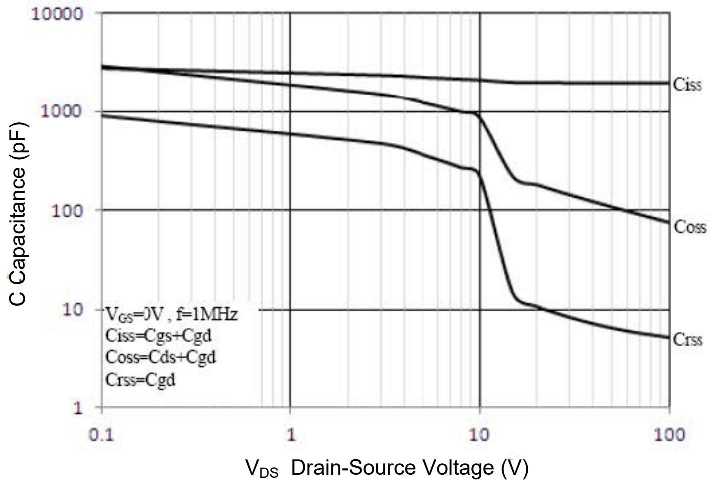

+150℃
+25℃
I_S Reverse Drain Current (A)
V_{SD} Source-Drain Voltage (V)
0
4
8
12
16
0
0.2
0.4
0.6
0.8
1
1.2

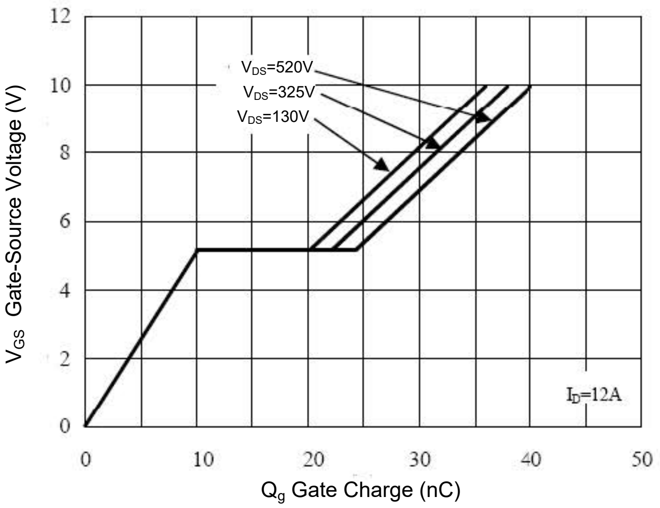

Pulse Duration=10µs
Duty Factor=0.5% Max
T_C=25℃
V_{GS}=10V
$R_{DS(on)}$ On-Resistance (Ω)
I_D Drain Current (A)
0.6
0.7
0.8
0.9
1.0
0
3
6
9
12


Pulse Duration=10µs
Duty Factor=0.5% Max
V_{GS}=10V,I_D=3.5A
Normalized On-Resistance
T_J Junction Temperature (℃)
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
-50
0
50
100
150


1.15
1.1
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
-75
-50
-25
0
25
50
75
100
125
150
175
$V_{GS(th)}$ Gate Threshold Voltage (Normalized)
T_J Junction Temperature (℃)

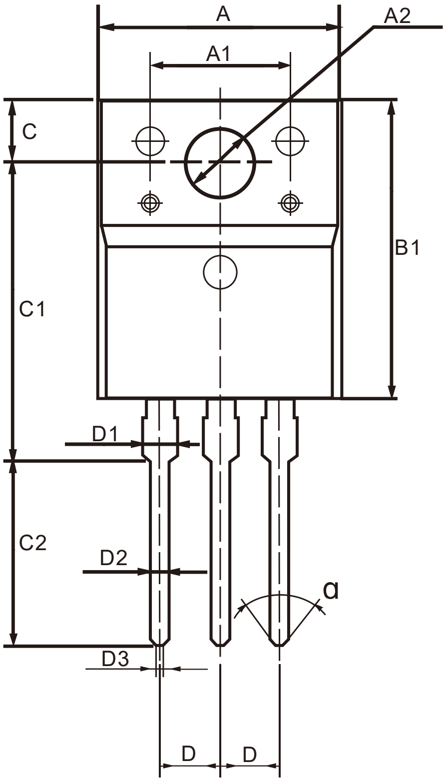

1.15
1.05
0.95
0.85
0.75
-55
-30
-5
20
45
70
95
120
145
170
V_{GS}=0V
I_D=250μA
$V_{(BR)DSS}$ Drain-Source Breakdown Voltage (Normalized)
T_J Junction Temperature (℃)

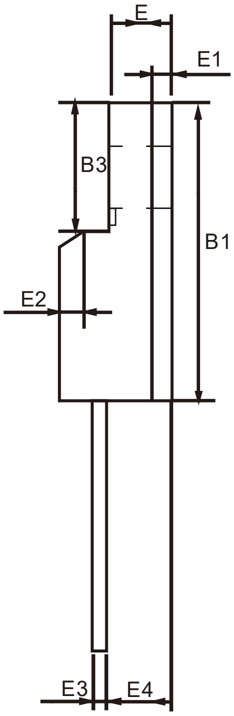

10000
1000
100
10
1
0.1
1
10
100
Ciss
Coss
Crss
V_{GS}=0V , f=1MHz
Ciss=Cgs+Cgd
Coss=Cds+Cgd
Crss=Cgd
C Capacitance (pF)
V_{DS} Drain-Source Voltage (V)

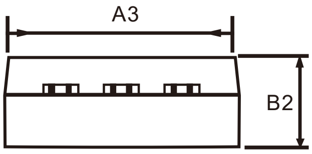

12
10
8
6
4
2
0
0
10
20
30
40
50
V_{DS}=520V
V_{DS}=325V
V_{DS}=130V
I_D=12A
V_{GS} Gate-Source Voltage (V)
Q_g Gate Charge (nC)

Package Outline

TO-220F
Dimensions in mm







TO-220F Package Dimensions

UNIT：mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	9.80		10.60	D		2.54	
A1		7.00		D1	1.15		1.55
A2	2.90		3.40	D2	0.60		1.00
A3	9.10		9.90	D3	0.20		0.50
B1	15.40		16.40	E	2.24		2.84
B2	4.35		4.95	E1		0.70	
B3	6.00		7.40	E2		1.0×45°	
C	3.00		3.70	E3	0.35		0.65
C1	15.00		17.00	E4	2.30		3.30
C2	8.80		10.80	α（度）		30°	

Contact Information

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For additional information, please contact your local Sales Representative.

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