



# SPP5413

## P-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SPP5413 is the P-Channel logic enhancement mode power field effect transistors are produced using high cell density , DMOS trench technology. The SPP5413 has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

### FEATURES

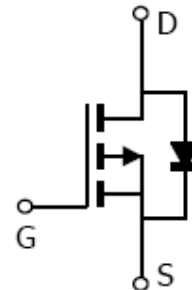
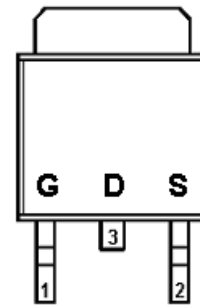
- ◆  $-40V/-10A, R_{DS(ON)}= 26m\Omega @ V_{GS}=- 10V$
- ◆  $-40V/- 8A, R_{DS(ON)}= 36m\Omega @ V_{GS}=- 4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-252 package design

### APPLICATIONS

- Power Management in Note book
- Powered System
- DC/DC Converter
- Load Switch

### PIN CONFIGURATION

TO-252



### PART MARKING





# SPP5413

## P-Channel Enhancement Mode MOSFET

### PIN DESCRIPTION

Pin	Symbol	Description
1	G	Gate
2	S	Source
3	D	Drain

### ORDERING INFORMATION

Part Number	Package	Part Marking
SPP5413T252RGB	TO-252	SPP5413

※ SPP5413T252RGB : Tape Reel ; Pb – Free ; Halogen - Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-40	V
Gate –Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current(T <sub>J</sub> =150°C)	I <sub>D</sub>	TA=25°C	-18
		TA=70°C	-10
Pulsed Drain Current	I <sub>DM</sub>	-30	A
Continuous Source Current(Diode Conduction)	I <sub>S</sub>	-2.3	A
Power Dissipation	P <sub>D</sub>	TA=25°C	2.8
		TA=70°C	1.8
Avalanche Energy with Single Pulse ( T <sub>J</sub> =25°C , L = 0.14mH , I <sub>AS</sub> = 43A , V <sub>DD</sub> = 20V. )	EAS	129	mJ
Operating Junction Temperature	T <sub>J</sub>	-55/150	°C
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C
Thermal Resistance-Junction to Ambient	R <sub>θJA</sub>	70	°C/W



# SPP5413

## P-Channel Enhancement Mode MOSFET

### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

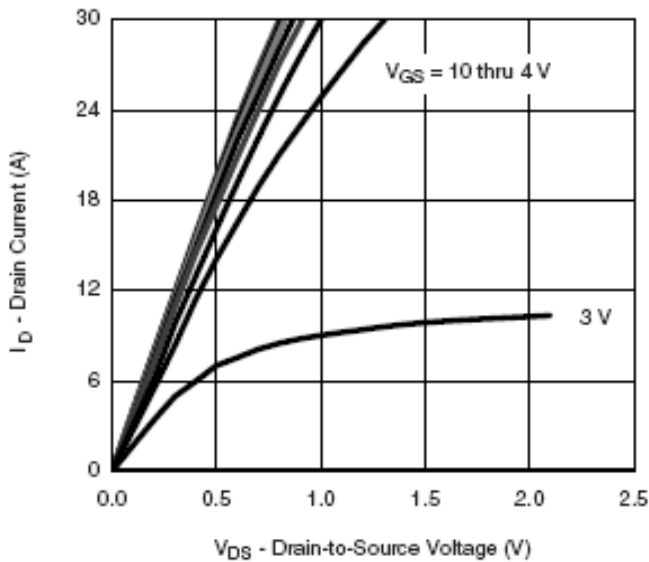
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.8		-2.5	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-32V, V_{GS}=0V$			-1	uA
		$V_{DS}=-32V, V_{GS}=0V$ $T_J=55^\circ C$			-10	
On-State Drain Current	$I_{D(on)}$	$V_{DS}=-5V, V_{GS}=-4.5V$	-10			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-10A$		0.021	0.026	$\Omega$
		$V_{GS}=-4.5V, I_D=-8A$		0.030	0.036	
Forward Transconductance	$g_{fs}$	$V_{DS}=-15V, I_D=-5.7A$		13		S
Diode Forward Voltage	$V_{SD}$	$I_S=-2.3A, V_{GS}=0V$		-0.8	-1.2	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=-20V, V_{GS}=-4.5V$ $I_D=-5.0A$		13	20	nC
Gate-Source Charge	$Q_{gs}$			4.5		
Gate-Drain Charge	$Q_{gd}$			6.5		
Input Capacitance	$C_{iss}$	$V_{DS}=-20V, V_{GS}=0V$ $f=1MHz$		1100		pF
Output Capacitance	$C_{oss}$			145		
Reverse Transfer Capacitance	$C_{rss}$			115		
Turn-On Time	$t_{d(on)}$	$V_{DD}=-20V, R_L=4\Omega$ $I_D=-5.0A, V_{GEN}=-4.5V$ $R_G=1\Omega$		40	80	nS
	$t_r$			55	100	
Turn-Off Time	$t_{d(off)}$			30	60	
	$t_f$			12	20	



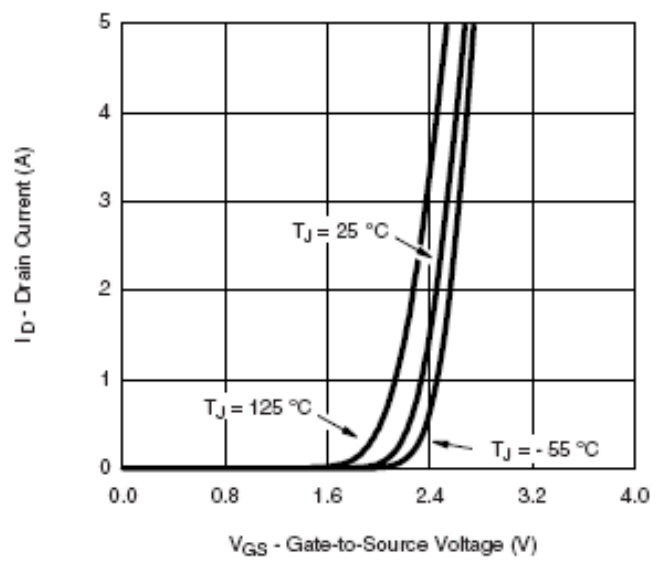
# SPP5413

## P-Channel Enhancement Mode MOSFET

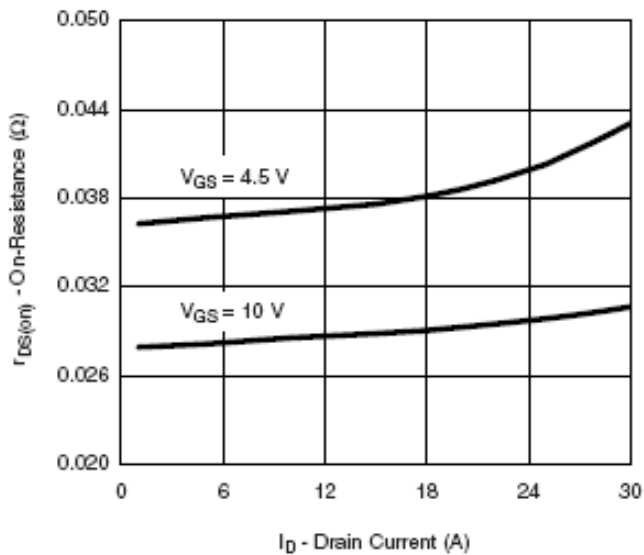
### TYPICAL CHARACTERISTICS



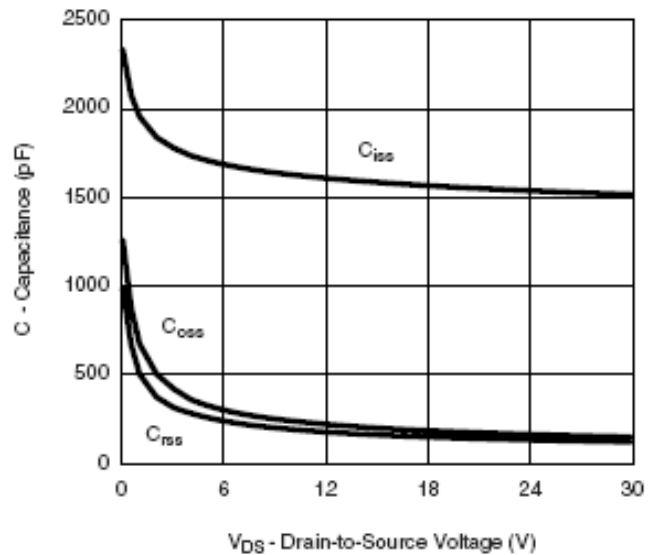
Output Characteristics



Transfer Characteristics



On-Resistance vs. Drain Current



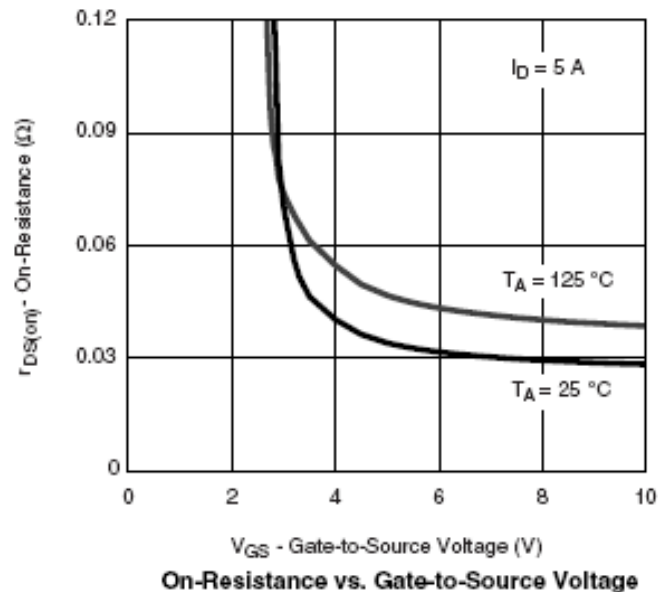
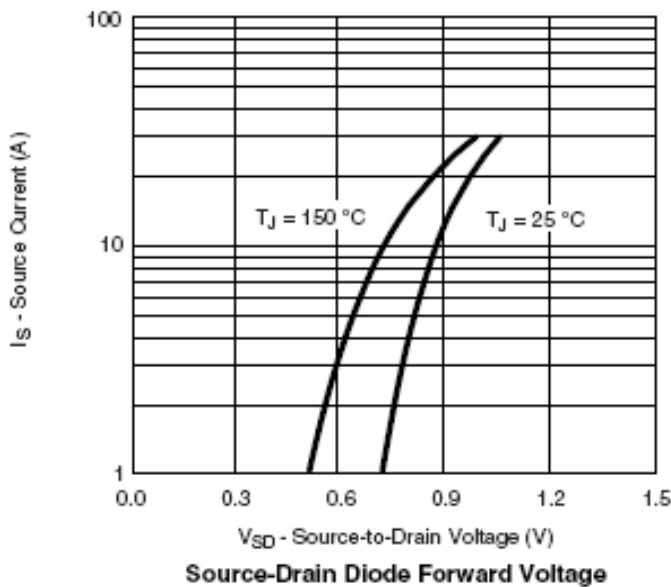
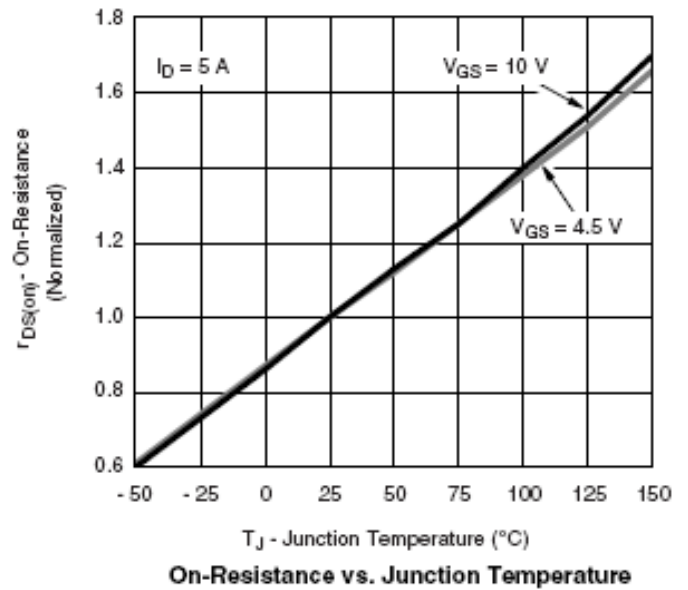
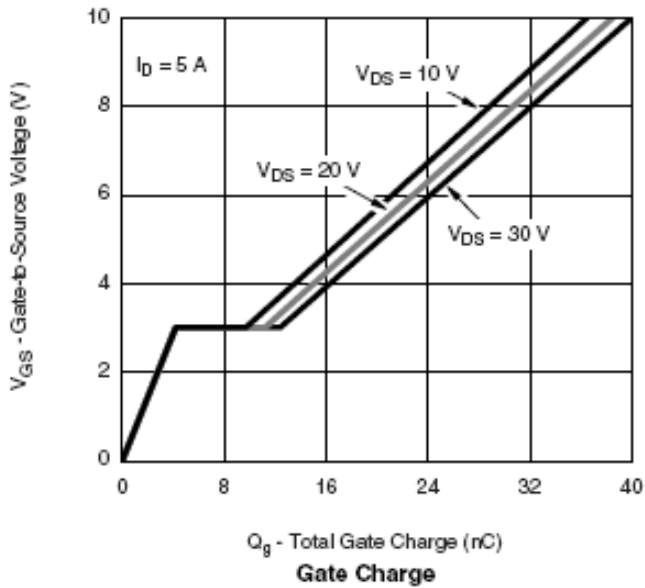
Capacitance



# SPP5413

## P-Channel Enhancement Mode MOSFET

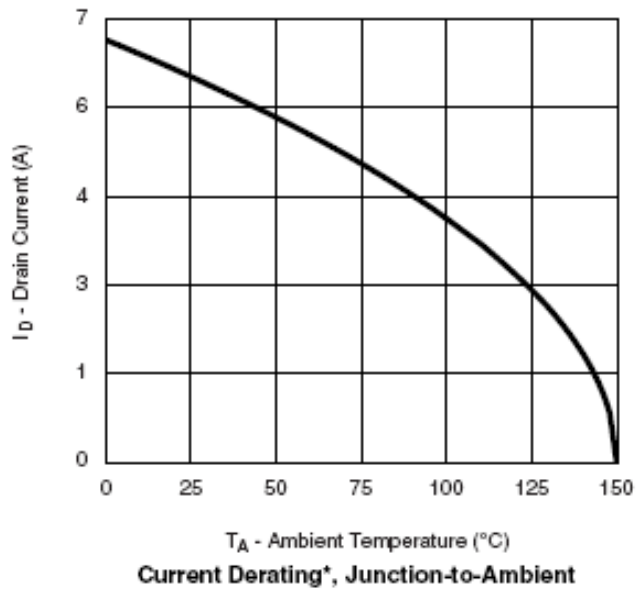
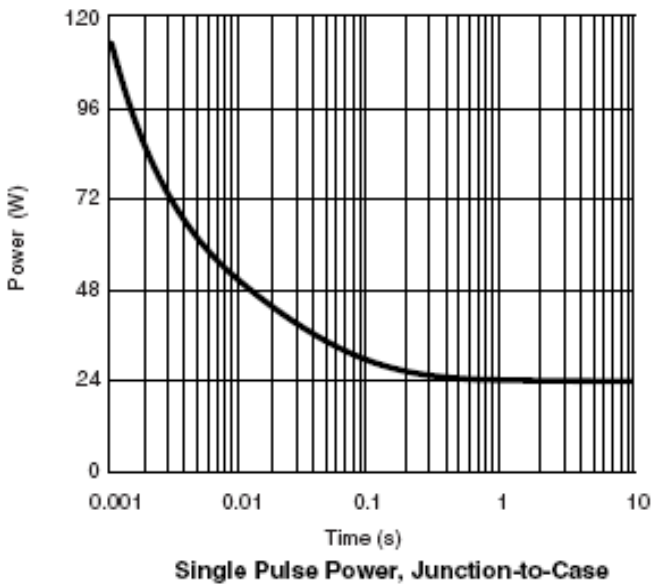
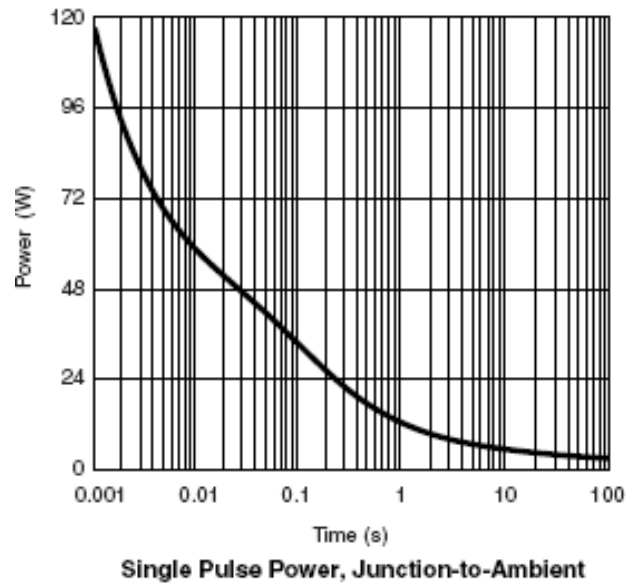
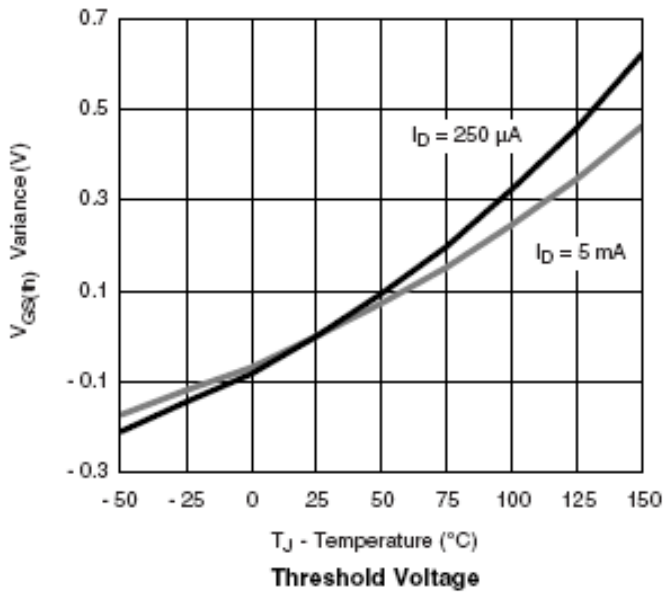
### TYPICAL CHARACTERISTICS





# SPP5413 P-Channel Enhancement Mode MOSFET

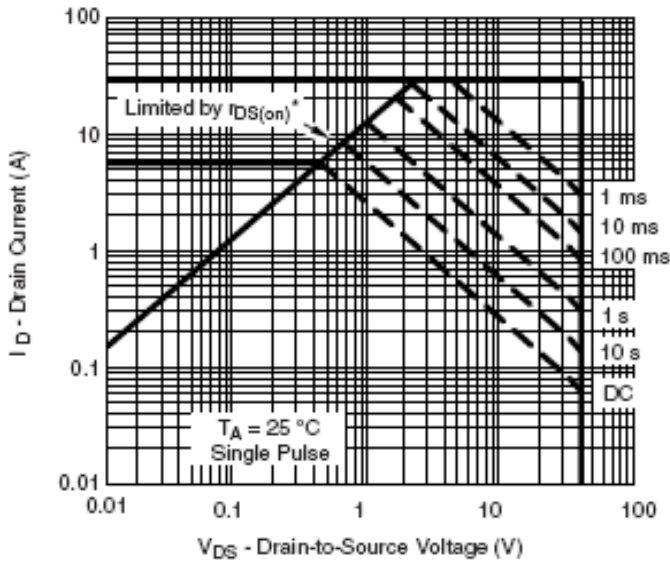
## TYPICAL CHARACTERISTICS



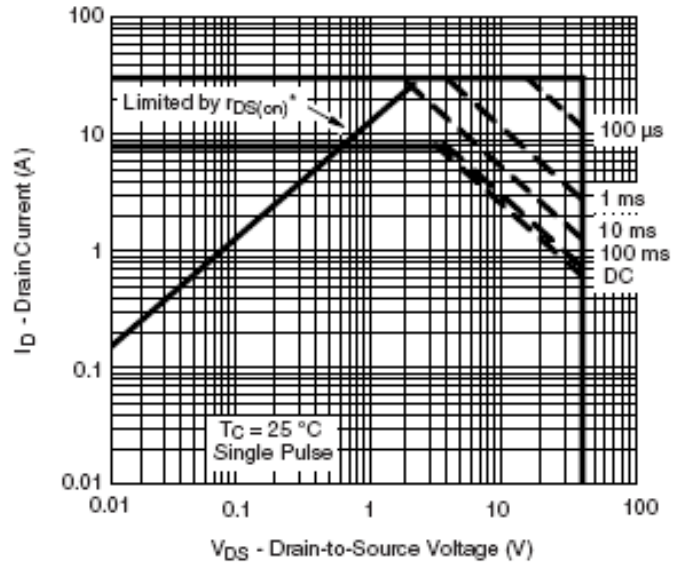


# SPP5413 P-Channel Enhancement Mode MOSFET

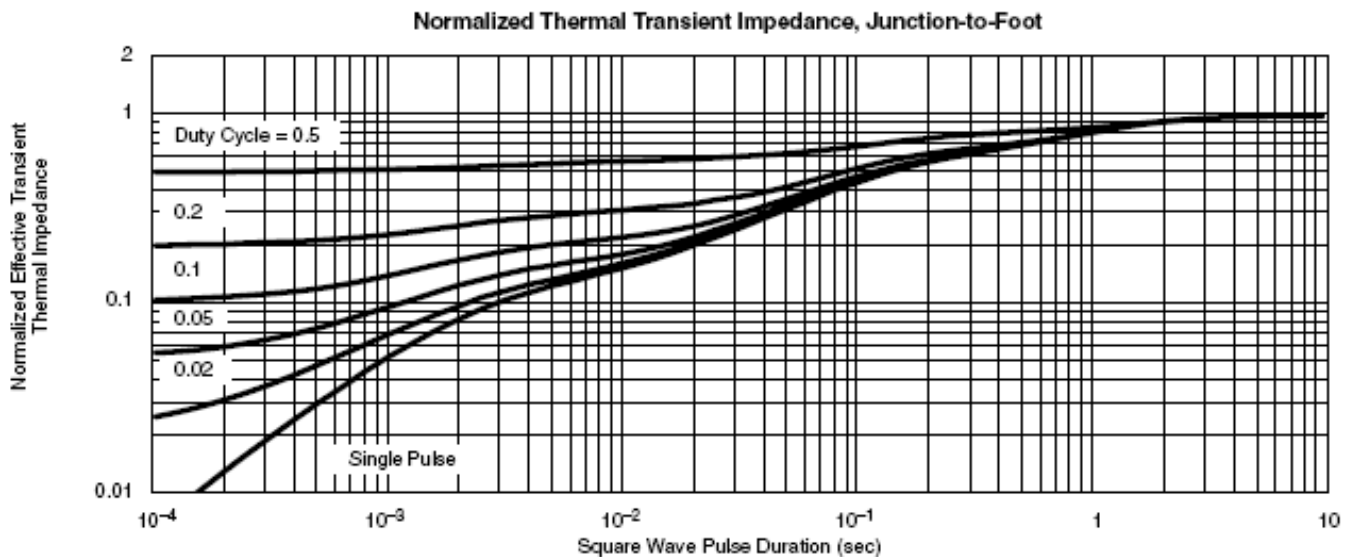
## TYPICAL CHARACTERISTICS



\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $r_{DS(on)}$  is specified  
**Safe Operating Area, Junction-to-Ambient**



\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $r_{DS(on)}$  is specified  
**Safe Operating Area, Junction-to-Case**

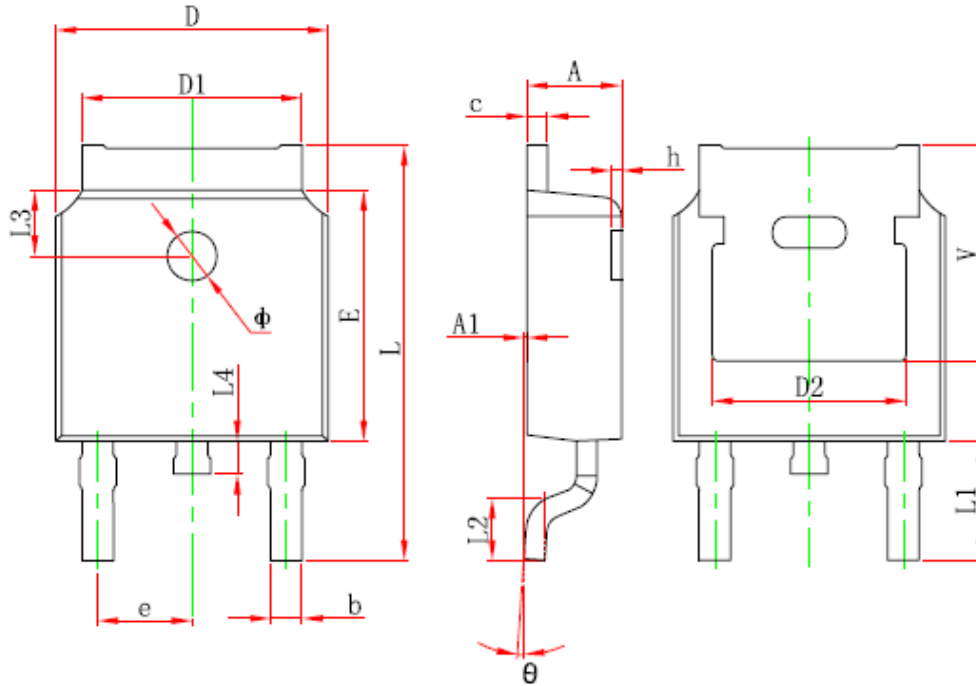




# SPP5413

## P-Channel Enhancement Mode MOSFET

### TO-252 PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	





# SPP5413

## P-Channel Enhancement Mode MOSFET

---

Information provided is alleged to be exact and consistent. SYNC Power Corporation presumes no responsibility for the penalties of use of such information or for any violation of patents or other rights of third parties which may result from its use. No license is granted by allegation or otherwise under any patent or patent rights of SYNC Power Corporation. Conditions mentioned in this publication are subject to change without notice. This publication surpasses and replaces all information previously supplied. SYNC Power Corporation products are not authorized for use as critical components in life support devices or systems without express written approval of SYNC Power Corporation.

©The SYNC Power logo is a registered trademark of SYNC Power Corporation

©2004 SYNC Power Corporation – Printed in Taiwan – All Rights Reserved

SYNC Power Corporation

7F-2, No.3-1, Park Street

NanKang District (NKSP), Taipei, Taiwan 115

Phone: 886-2-2655-8178

---



# SPP5413

## P-Channel Enhancement Mode MOSFET

---

Fax: 886-2-2655-8468  
©<http://www.syncpower.com>