SPC5604
N & P Pair Enhancement Mode MOSFET

DESCRIPTION

The SPC5604 is the N- and P-Channel enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as notebook computer power management and other battery powered circuits where high-side switching, low in-line power loss, and resistance to transients are needed.

APPLICATIONS

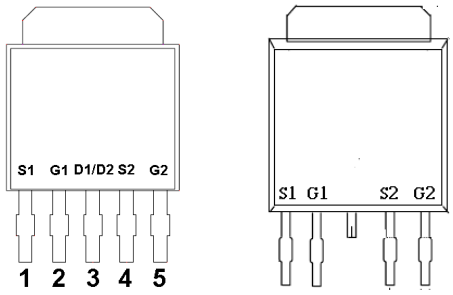
- Power Management in Note book
- Battery Powered System
- DC/DC Converter
- LCD Display inverter

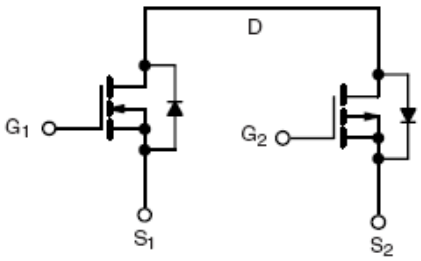
FEATURES

- N-Channel
  40V/10A,$R_{DS(ON)}$= 24mΩ@V_{GS}= 10V
  40V/ 8A,$R_{DS(ON)}$= 28mΩ@V_{GS}= 4.5V
  40V/ 6A,$R_{DS(ON)}$= 32mΩ@V_{GS}= 2.5V
- P-Channel
  -40V/-10A,$R_{DS(ON)}$= 32mΩ@V_{GS}=- 10V
  -40V/- 8A,$R_{DS(ON)}$= 42mΩ@V_{GS}=- 4.5V
- Super high density cell design for extremely low RDS (ON)
- Exceptional on-resistance and maximum DC current capability
- TO-252-5L package design

PIN CONFIGURATION

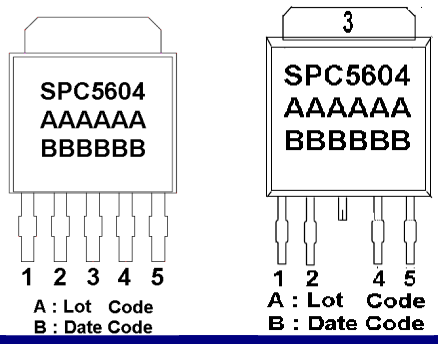
(TO-252-5L) (TO-252-4L)





N-Channel MOSFET P-Channel MOSFET

PART MARKING



SPC5604
N & P Pair Enhancement Mode MOSFET

PIN DESCRIPTION

Pin	Description(TO-252-5L)	Description(TO-252-4L)
1	Source 1	Source 1
2	Gate 1	Gate 1
3	Drain1/Drain2	Drain
4	Source 2	Source 2
5	Gate 2	Gate 2

ORDERING INFORMATION

Part Number	Package	Part Marking
SPC5604T255RGB	T0-252-5L	SPC5604
SPC5604T254RGB	T0-252-4L	SPC5604

※ SPC5604T255RGB: 13” Tape Reel ; Pb – Free ; Halogen – Free
※ SPC5604T254RGB :13” Tape Reel ; Pb – Free ; Halogen – Free

ABSOULTE MAXIMUM RATINGS

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Typical		Unit
			N-Channel	P-Channel	
Drain-Source Voltage		V_{DSS}	40	-40	V
Gate –Source Voltage		V_{GSS}	±20	±20	V
Continuous Drain Current(T_J=150℃)	T_A=25℃	I_D	10.0	-10.0	A
	T_A=70℃		7.0	-7.0	
Pulsed Drain Current		I_{DM}	25	-25	A
Continuous Source Current(Diode Conduction)		I_S	2.3	-2.3	A
Power Dissipation	T_A=25℃	P_D	2.5	2.8	W
	T_A=70℃		1.6	1.8	
Operating Junction Temperature		T_J	-55/150		℃
Storage Temperature Range		T_{STG}	-55/150		℃
Thermal Resistance-Junction to Ambient	T ≤ 10sec	$R_{\theta JA}$	50	52	℃/W
	Steady State		80	80	

SPC5604
N & P Pair Enhancement Mode MOSFET

ELECTRICAL CHARACTERISTICS (NMOS)

(T_A=25℃ Unless otherwise noted)

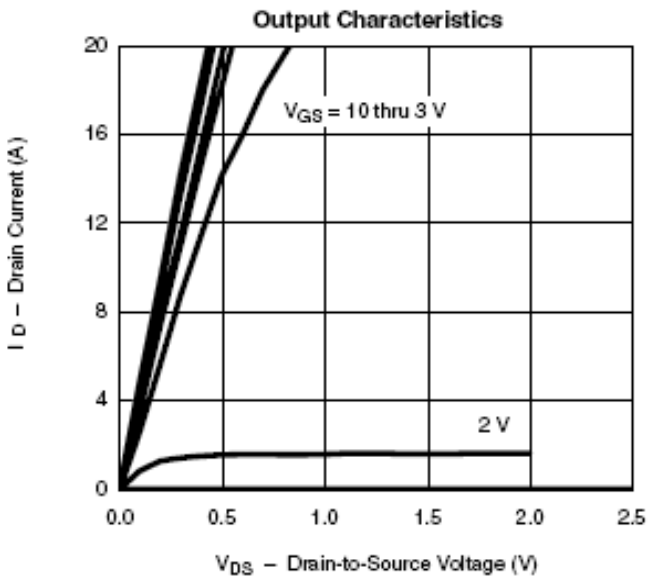
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	0.5		1.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=32V,V_{GS}=0V			1	uA
		V_{DS}=32V,V_{GS}=0V T_J=85℃			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		0.018	0.024	Ω
		V_{GS}=4.5V,I_D= 8A		0.022	0.028	
		V_{GS}=2.5V,I_D= 6A		0.026	0.032	
Forward Transconductance	gfs	V_{DS}=15V,I_D=6.2A		13		S
Diode Forward Voltage	V_{SD}	I_S=2.3A,V_{GS} =0V		0.8	1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=20V,V_{GS}=4.5V I_D= 5A		10	14	nC
Gate-Source Charge	Q_{gs}			2.8		
Gate-Drain Charge	Q_{gd}			3.2		
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V f=1MHz		850		pF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			75		
Turn-On Time	$t_{d(on)}$	V_{DD}=20V,R_L=4Ω I_D≡5.0A,V_{GEN}=10V R_G=1Ω		6	12	nS
	t_r			10	20	
Turn-Off Time	$t_{d(off)}$			20	36	
	t_f			6	12	

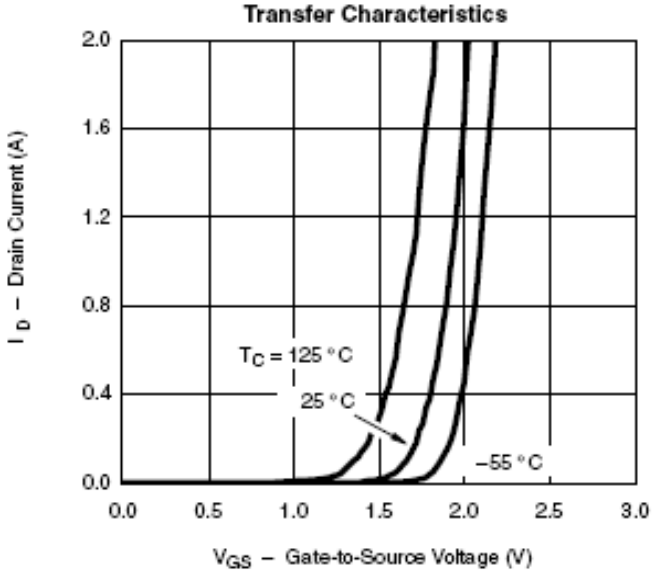
ELECTRICAL CHARACTERISTICS (PMOS)

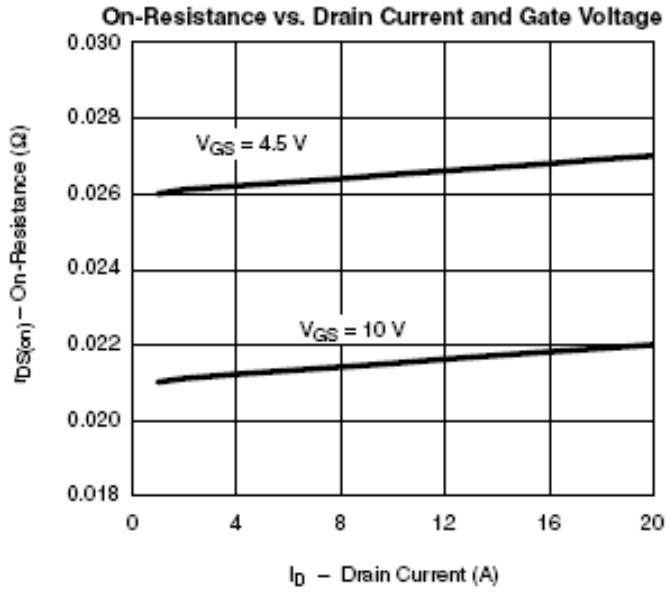
(T_A=25℃ Unless otherwise noted)

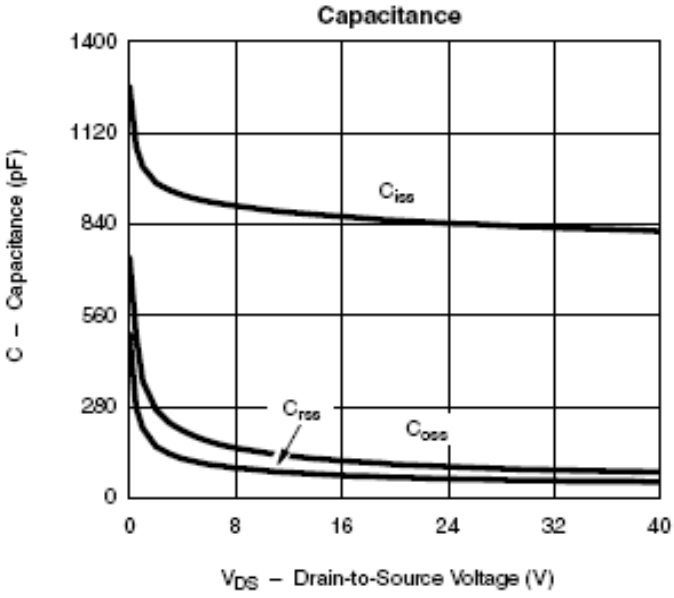
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=-250uA	-40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250uA	-0.8		-2.5	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-32V,V_{GS}=0V			-1	uA
		V_{DS}=-32V,V_{GS}=0V T_J=85℃			-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		0.028	0.032	Ω
		V_{GS}=-4.5V,I_D=- 8A		0.038	0.042	
Forward Transconductance	gfs	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
Dynamic						
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=4Ω I_D≡-5.0A,V_{GEN}=-4.5V R_G=1Ω		40	80	nS
	t_r			55	100	
Turn-Off Time	$t_{d(off)}$			30	60	
	t_f			12	20	

TYPICAL CHARACTERISTICS (NMOS)

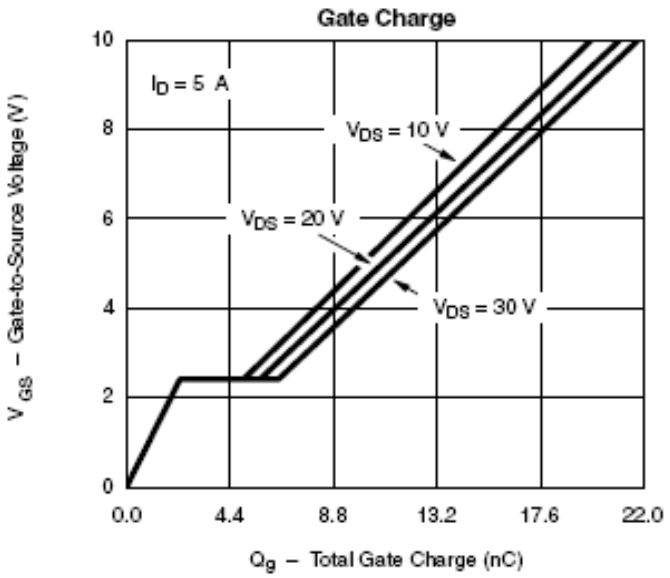


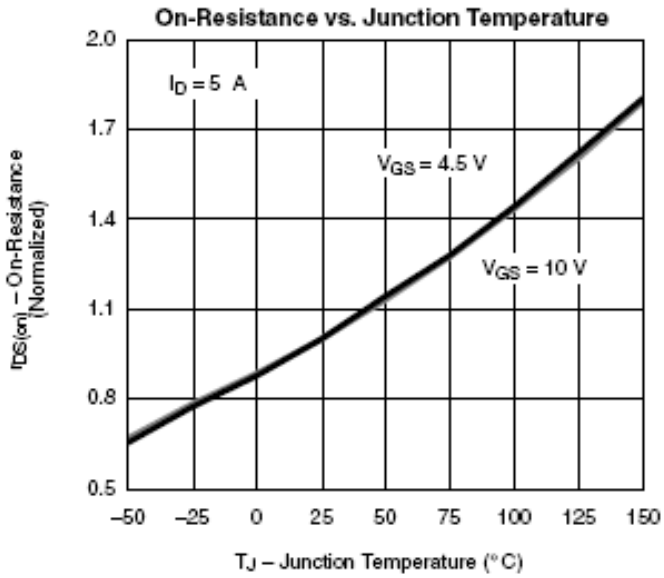


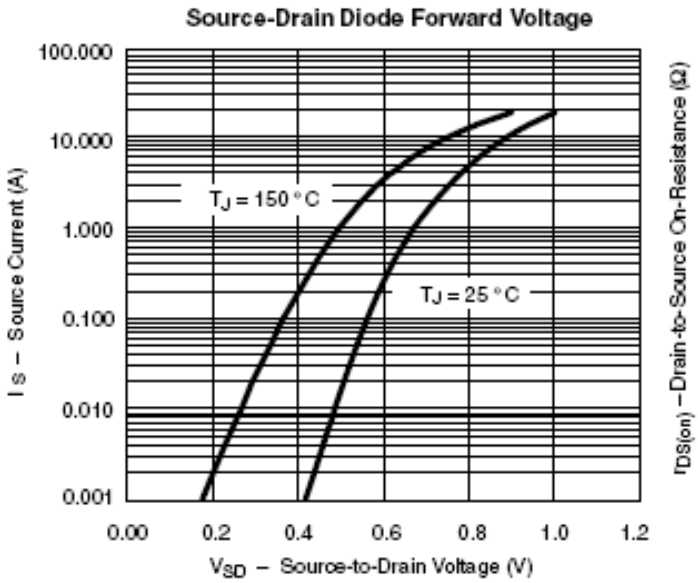


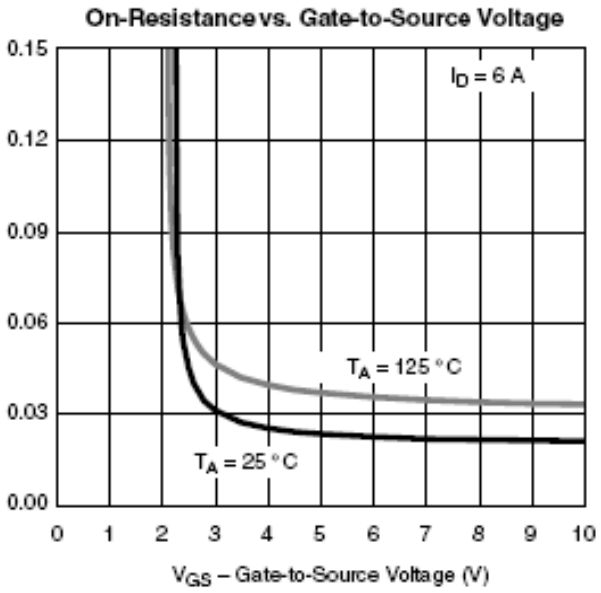


TYPICAL CHARACTERISTICS (NMOS)

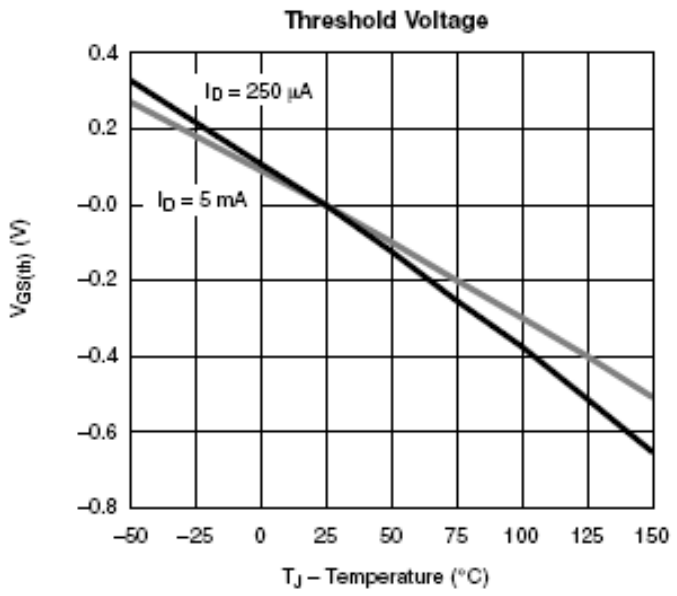


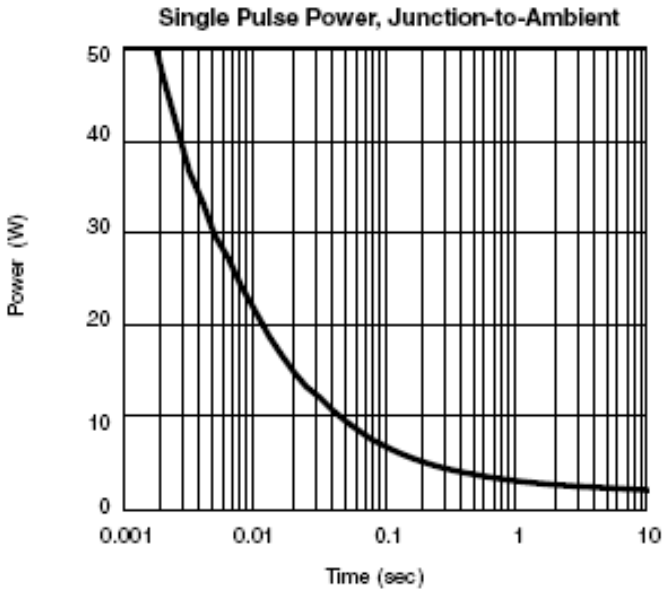


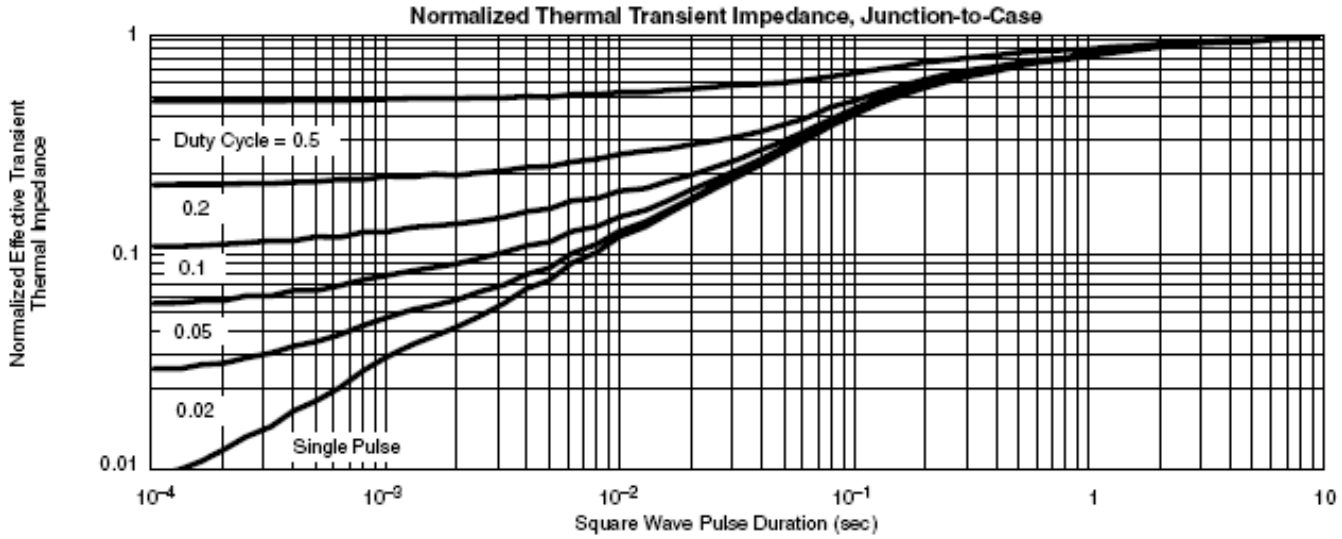




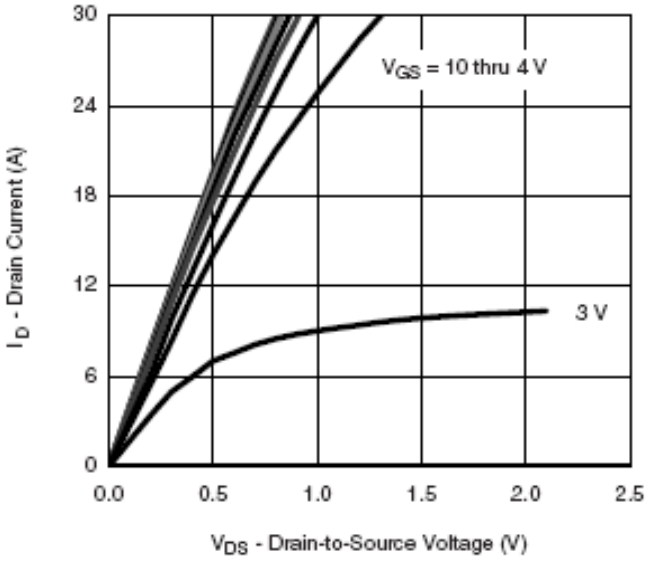
TYPICAL CHARACTERISTICS (NMOS)



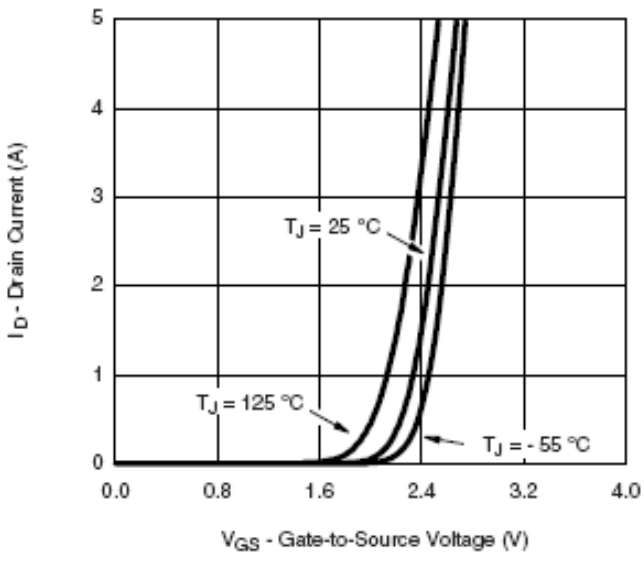




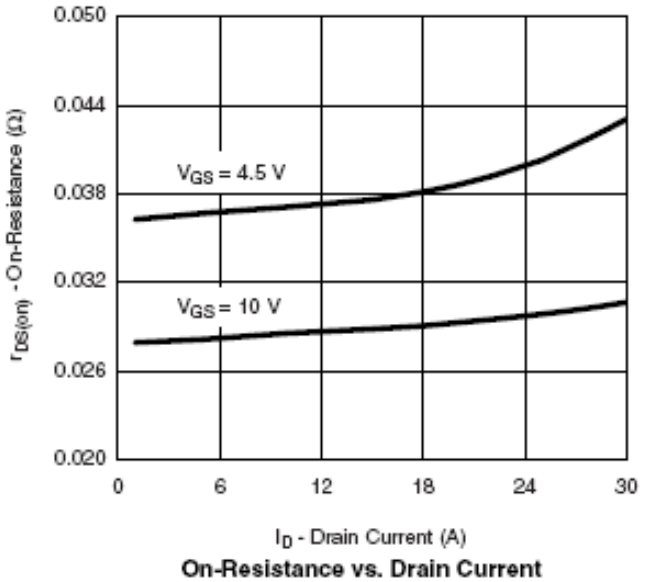
TYPICAL CHARACTERISTICS (PMOS)



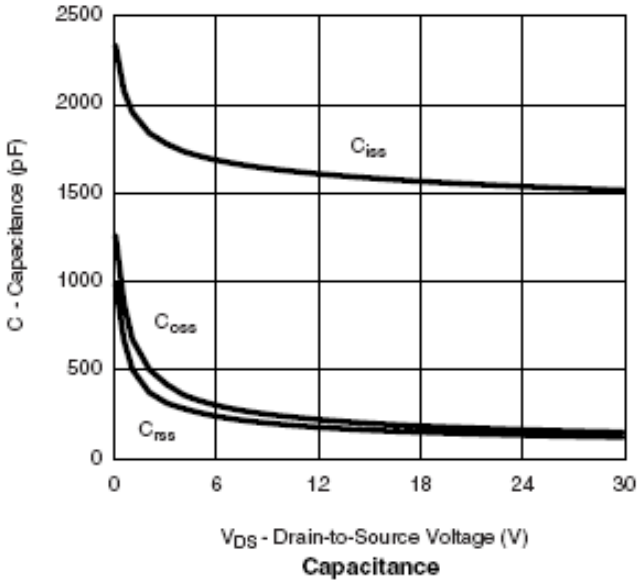
Output Characteristics



Transfer Characteristics

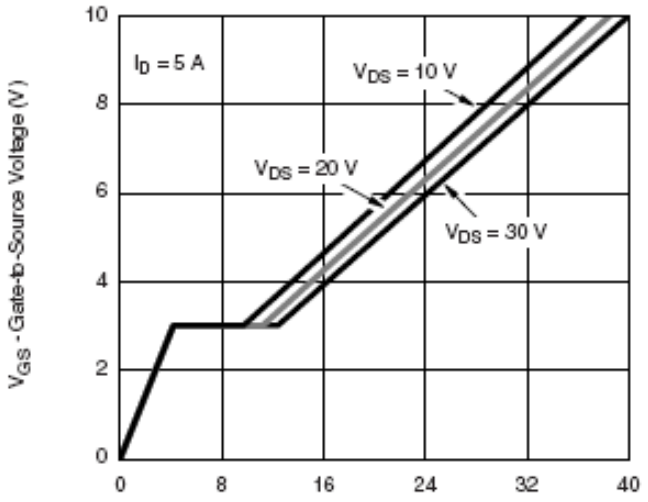


On-Resistance vs. Drain Current

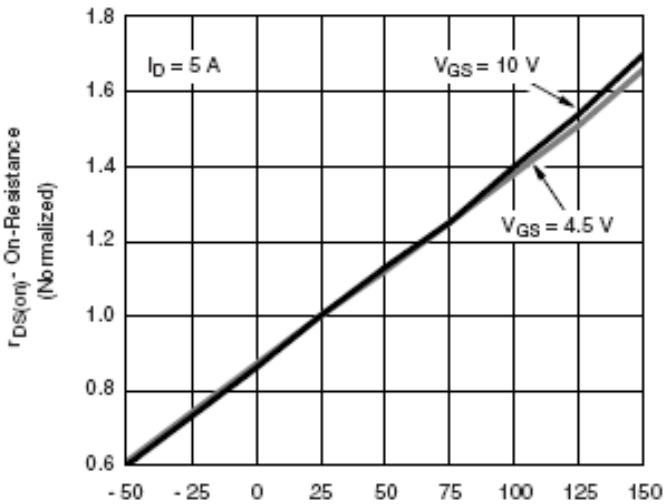


Capacitance

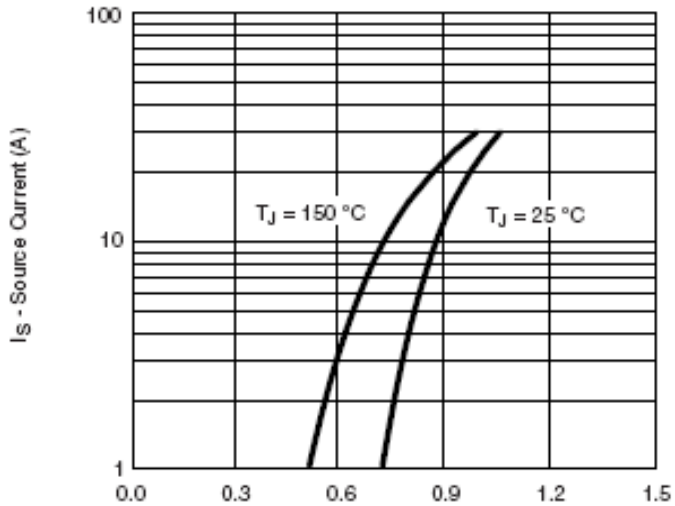
TYPICAL CHARACTERISTICS (PMOS)



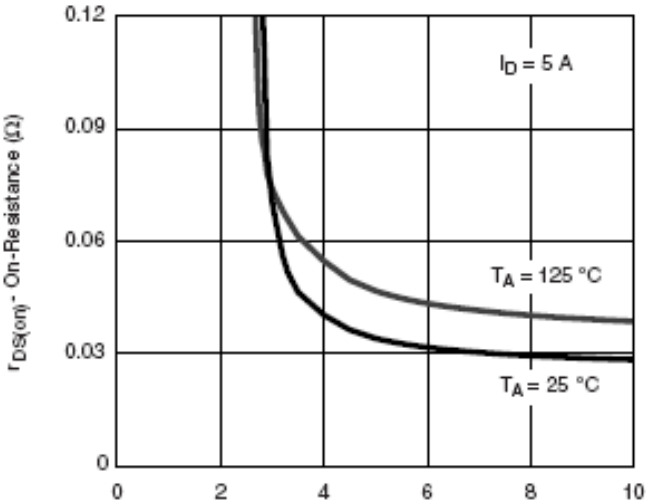
Gate Charge



On-Resistance vs. Junction Temperature

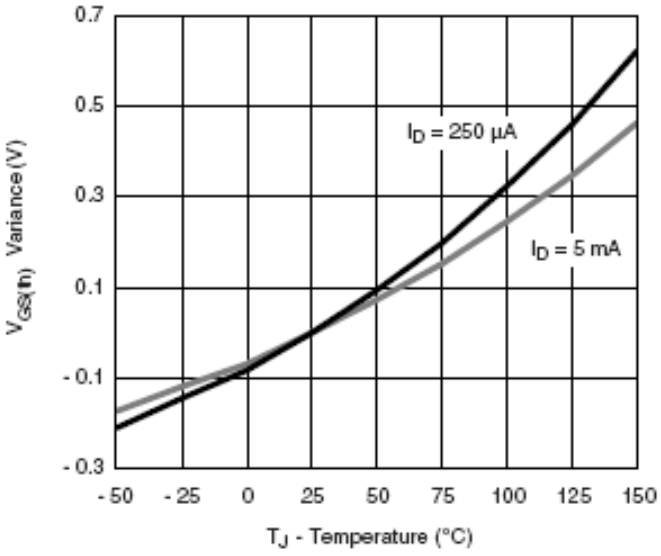


Source-Drain Diode Forward Voltage

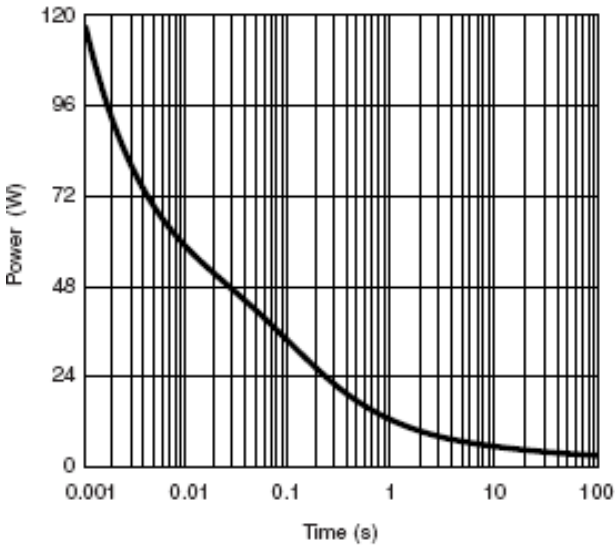


On-Resistance vs. Gate-to-Source Voltage

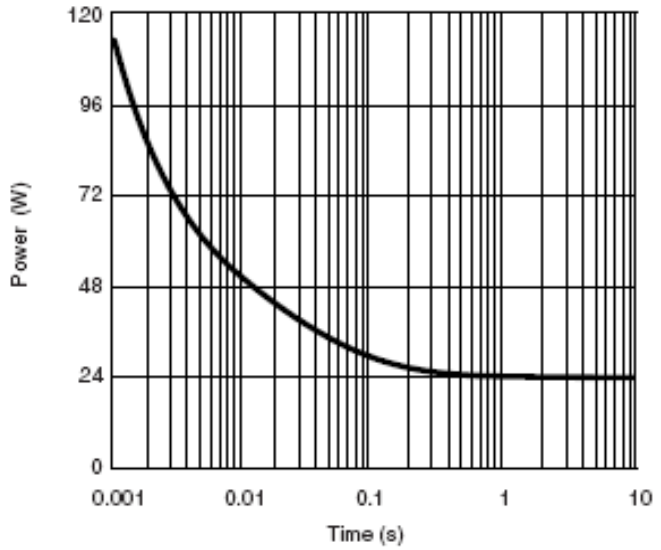
TYPICAL CHARACTERISTICS (PMOS)



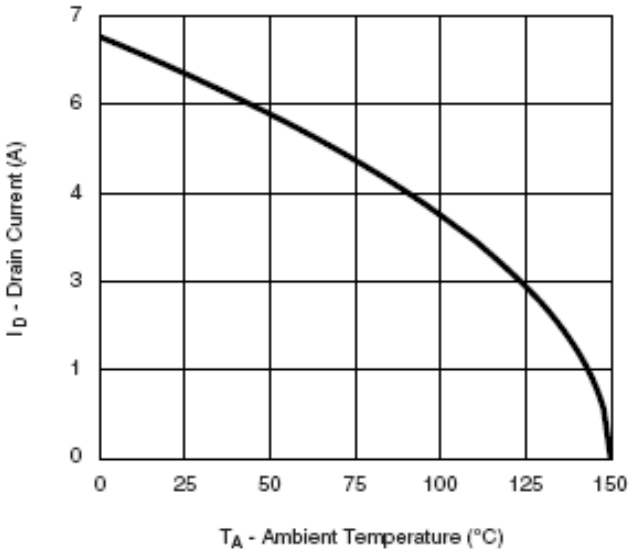
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

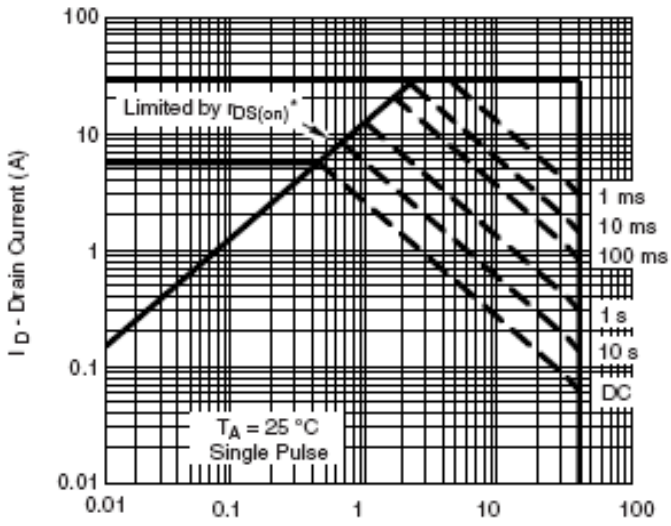


Single Pulse Power, Junction-to-Case

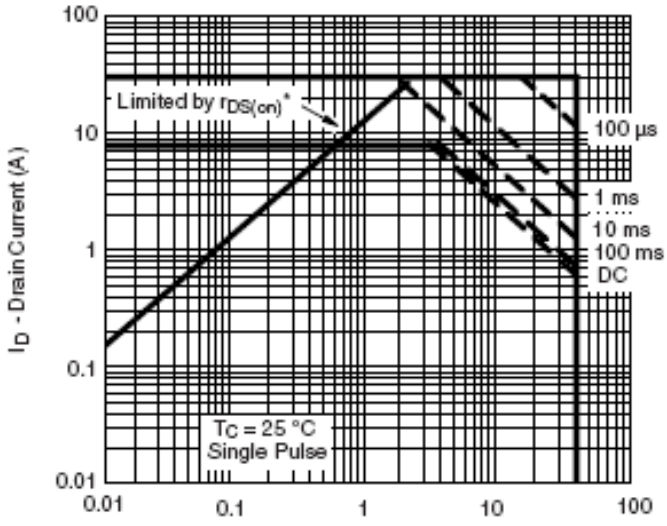


Current Derating*, Junction-to-Ambient

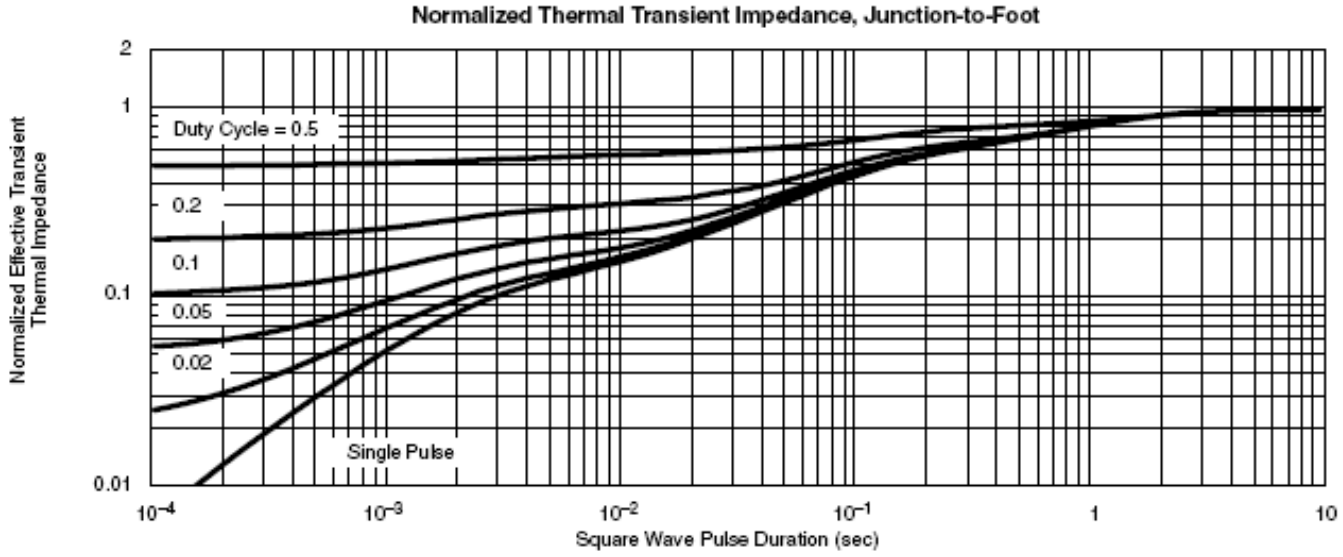
TYPICAL CHARACTERISTICS (PMOS)



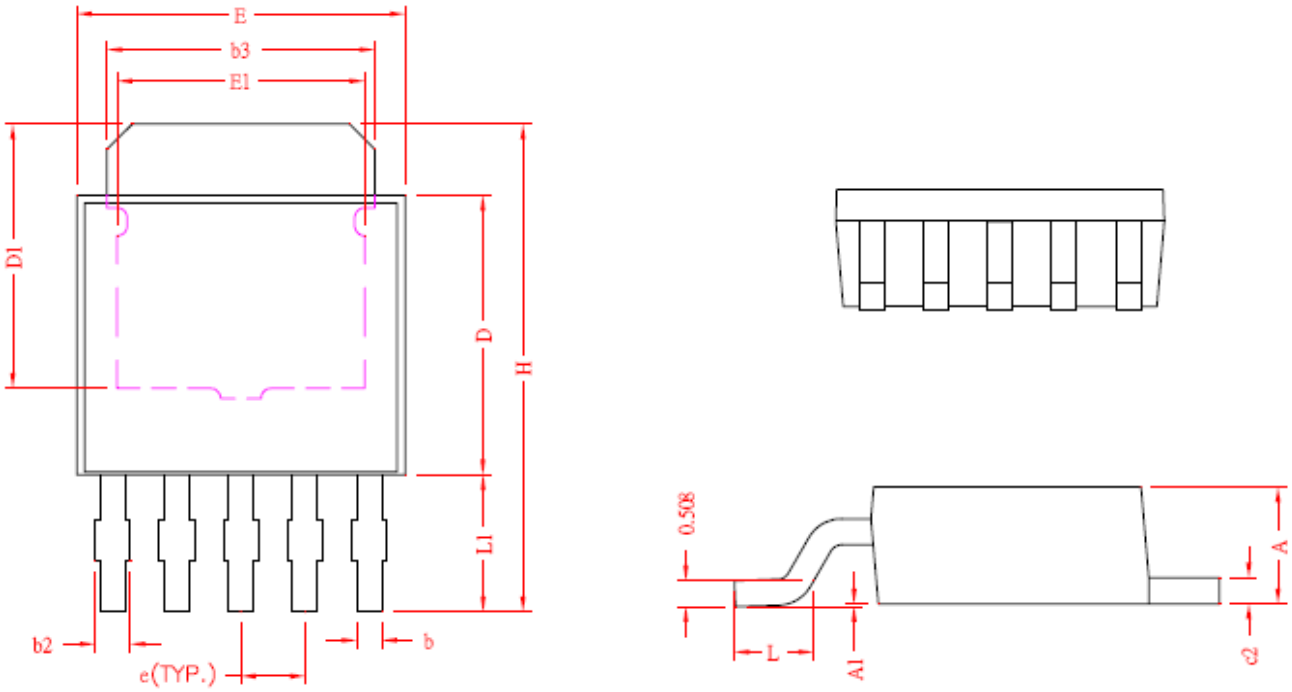
Safe Operating Area, Junction-to-Ambient



Safe Operating Area, Junction-to-Case

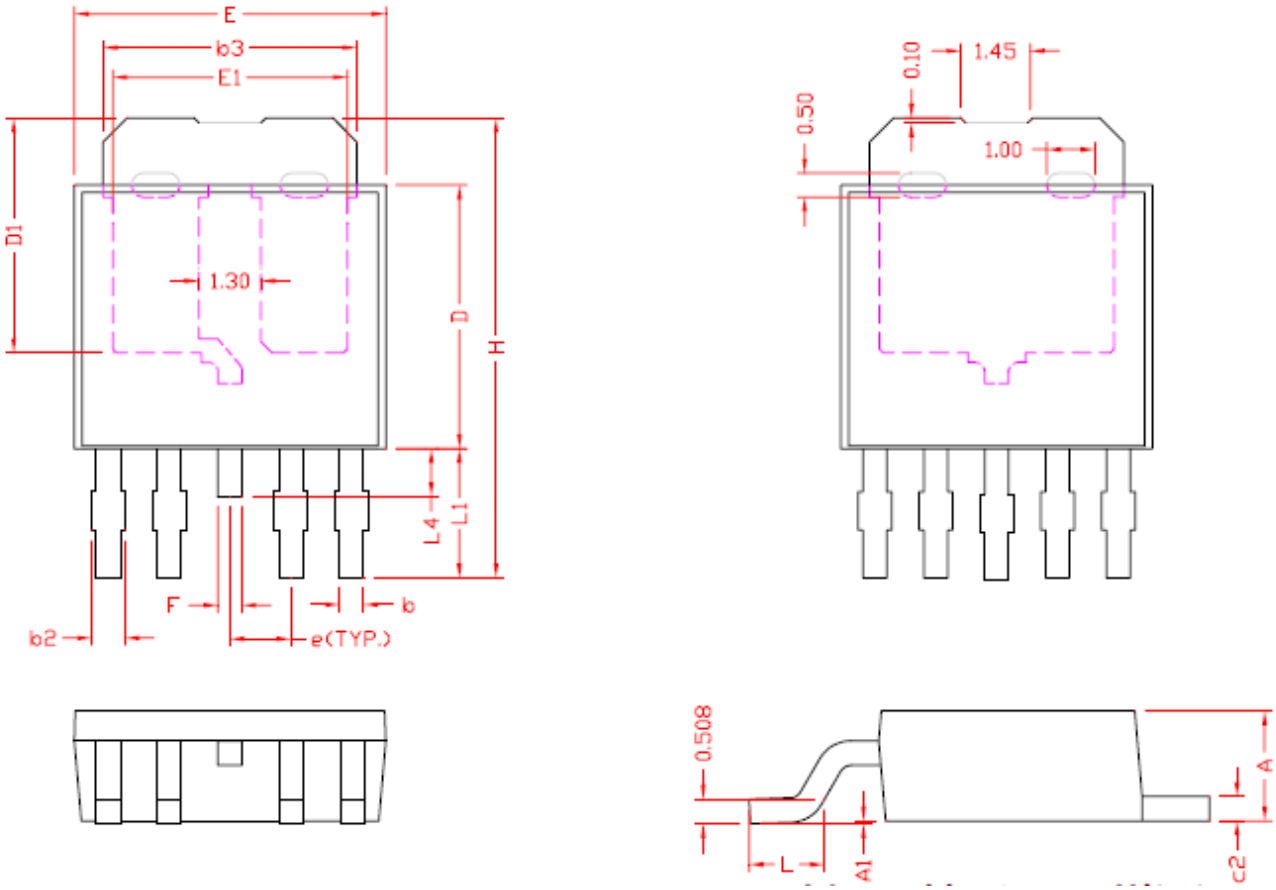


TO-252-5L PACKAGE OUTLINE



DIMENSIONS					
REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.20	2.40	D1	4.57	---
A1	0	0.15	E	6.35	6.73
b	0.45	0.60	E1	3.81	---
b2	0.50	0.80	e	1.27 REF.	
b3	5.21	5.46	H	9.40	10.20
c2	0.46	0.58	L	1.40	1.77
D	5.40	5.59	L1	2.40	3.00

TO-252-4L PACKAGE OUTLINE



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.20	2.40	E	6.40	6.80
A1	0	0.15	E1	3.81	---
b	0.40	0.60	e	1.27 REF.	
b2	0.50	0.80	F	0.40	0.60
b3	5.20	5.50	H	9.40	10.20
c2	0.45	0.55	L	1.40	1.77
D	5.40	5.80	L1	2.40	3.00
D1	4.27	---	L4	0.80	1.20

SYNC Power Corporation
7F-2, No.3-1, Park Street
NanKang District (NKSP), Taipei, Taiwan 115
Phone: 886-2-2655-8178
Fax: 886-2-2655-8468
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