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TPM30NP40K5

N+P-Channel Enhancement Mode MOSFET

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Features

N-MOS

- V_{DS} =30V,I_D =40A

  $R_{DS(ON)}$ 10mΩ @ V_{GS}=10V (Typ)

  $R_{DS(ON)}$ 15mΩ @ V_{GS}=-4.5V (Typ)

P-MOS

- V_{DS} =-30V,I_D =-40A

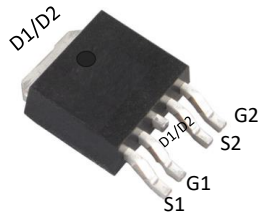
  $R_{DS(ON)}$ 13mΩ @ V_{GS}=-10V (Typ)

  $R_{DS(ON)}$ 20mΩ @ V_{GS}=-4.5V (Typ)

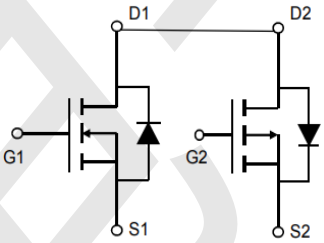
Application

- Load/Power Switching
- Interfacing Switching
- Battery Management for Ultra Small Portable Electronics
- Logic Level Shift

Package and Pin Configuration



TO-252-4L



Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Symbol	Parameter		N-Channel	P-Channel	Unit
Common Ratings (TC=25°C Unless Otherwise Noted)					
V_{DS}	Drain-Source Breakdown Voltage		30	-30	V
V_{GS}	Gate-Source Voltage		±20	±20	V
T_J	Maximum Junction Temperature		150	150	°C
T_{STG}	Storage Temperature Range		-55 to 150	-55 to 150	°C
I_S	Diode Continuous Forward Current	Tc=25°C	40	-40	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested	Tc=25°C	160	-170	A
I_D	Continuous Drain Current@GS=10V	Tc=25°C	40	-40	A
P_D	Maximum Power Dissipation	Tc=25°C	42	46	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient((*1 in2 Pad of 2-oz Copper), Max.)		62.5	62.5	°C/W

N-Ch Electrical Characteristics (TJ=25℃ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$BV_{(BR)DSS}$	Drain-Source Breakdown Voltage	VGS=0V，ID=250μA	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	VDS=30V，VGS=0V	--	--	1	uA
I_{GSS}	Gate-Body Leakage Current	VGS=±20V，VDS=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	VDS=VGS，ID=250μA	1.0	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	VGS=10V， ID=20A	--	6.5	10	mΩ
		VGS=4.5V，ID=15A	--	9.2	15	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	VDS=15V，VGS=0V， f=1MHz	--	1300	--	pF
C_{OSS}	Output Capacitance		--	180	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	110	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	VDS=20V，ID=12A，VGS=4.5V	--	14	--	nC
Q_{gs}	Gate Source Charge		--	3.5	--	nC
Q_{gd}	Gate Drain Charge		--	7	--	nC
$t_{d(on)}$	Turn-on Delay Time	VDD=12V，ID=5A，VGS=10V，RG=3.3Ω	--	5	--	nS
t_r	Turn-on Rise Time		--	12	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	27	--	nS
t_f	Turn-Off Fall Time		--	10	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=1A，	--	--	1.2	V

P-Ch Electrical Characteristics (TJ=25℃ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$BV_{(BR)DSS}$	Drain-Source Breakdown Voltage	VGS=0V，ID=-250μA	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	VDS=-30V，VGS=0V	--	--	-1	uA
I_{GSS}	Gate-Body Leakage Current	VGS=±20V，VDS=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	VDS=VGS，ID=-250μA	-1.0	-1.5	-2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	VGS=-10V， ID=-15A	--	8.8	13	mΩ
		VGS=-4.5V，ID=-10A	--	12	20	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	VDS=-15V，VGS=0V， f=1MHz	--	2800	--	pF
C_{OSS}	Output Capacitance		--	350	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	300	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	VDD=-15V，ID=-15A，VGS=-10V	--	30	--	nC
Q_{gs}	Gate Source Charge		--	5.5	--	nC
Q_{gd}	Gate Drain Charge		--	7.5	--	nC
$t_{d(on)}$	Turn-on Delay Time	VDD=-15V，ID=-15A，VGS=-10V，RG=2.5Ω	--	13	--	nS
t_r	Turn-on Rise Time		--	20	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	90	--	nS
t_f	Turn-Off Fall Time		--	65	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=-1A，	--	--	-1.2	V

N-Channel Typical Operating Characteristics

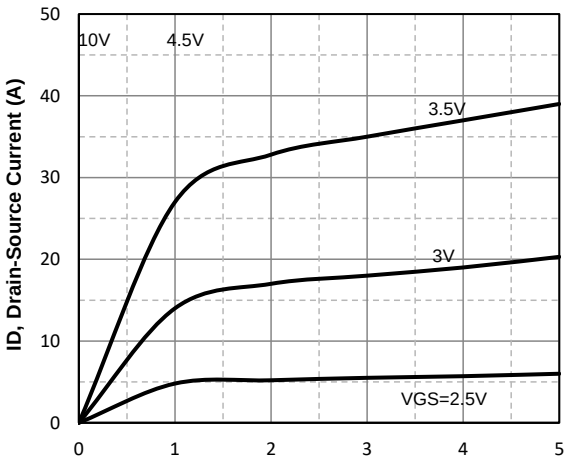


Fig1. Typical Output Characteristics

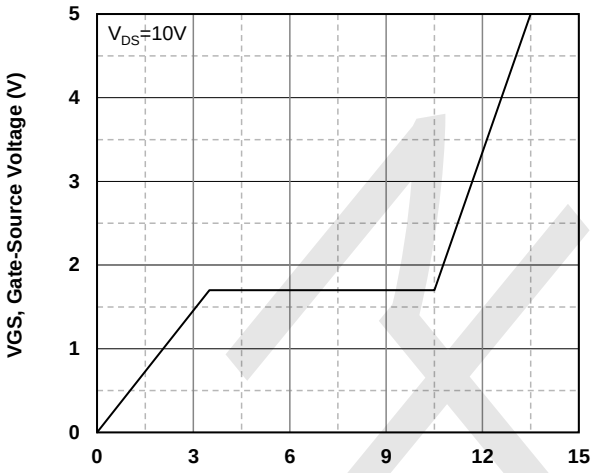


Fig2. Typical Gate Charge Vs.Gate-Source Voltage

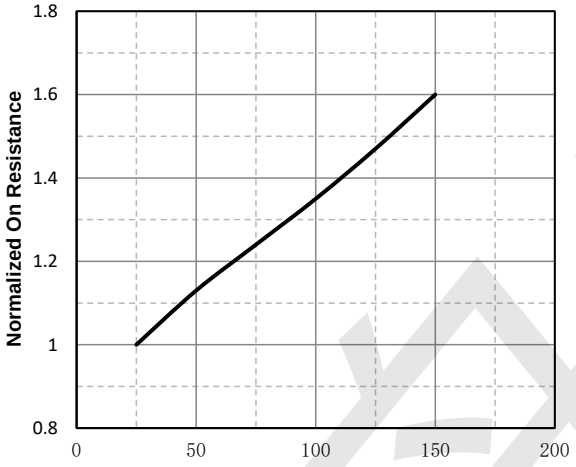


Fig3. Normalized On-Resistance Vs. Temperature

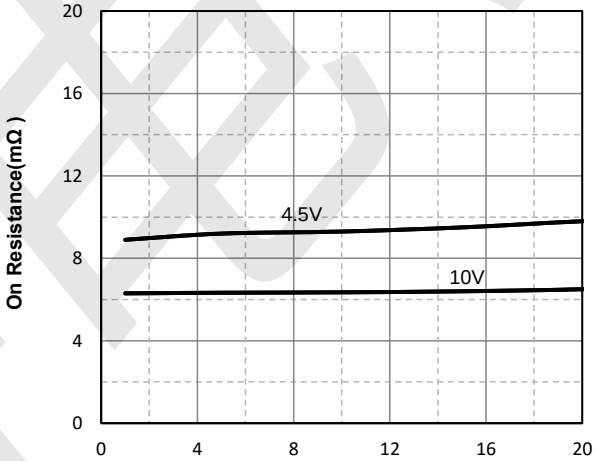


Fig4. On-Resistance Vs. Drain-Source Current

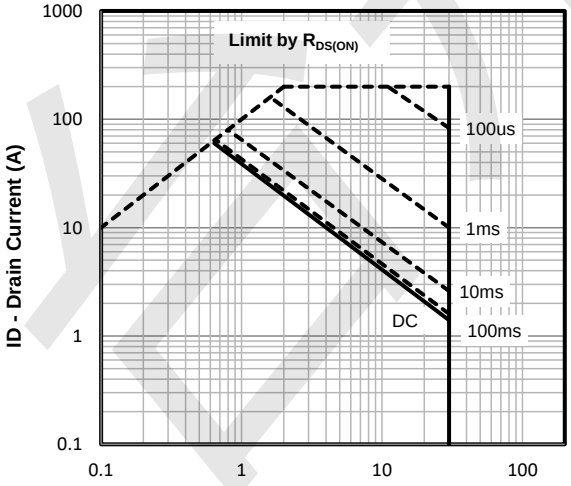


Fig5. Maximum Safe Operating Area

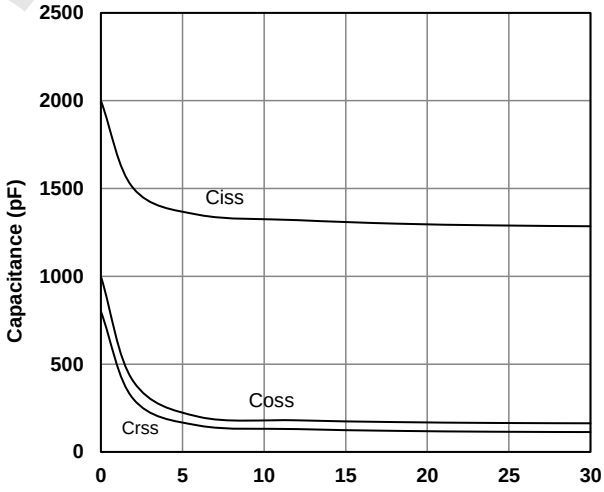


Fig6 Typical Capacitance Vs.Drain-Source Voltage

P-Channel Typical Operating Characteristics

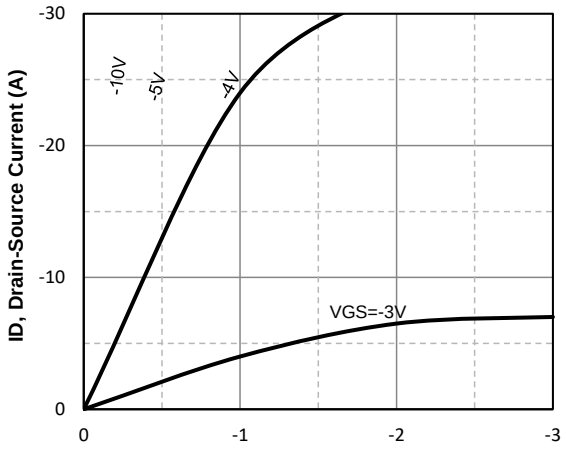


Fig1. Typical Output Characteristics

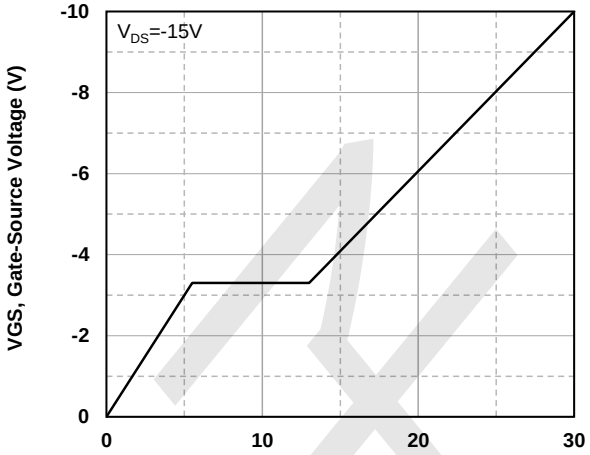


Fig2. Typical Gate Charge Vs.Gate-Source Voltag

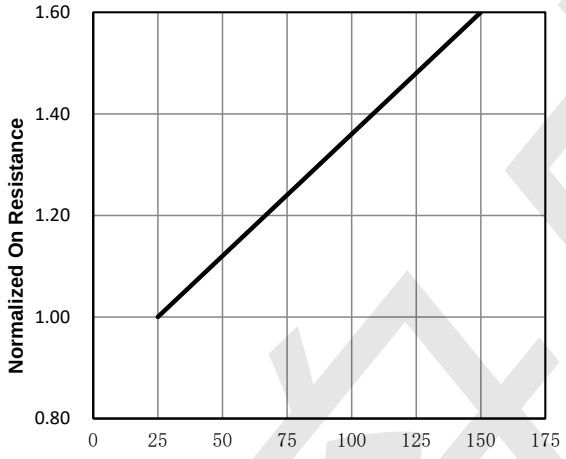


Fig3. Normalized On-Resistance Vs. Temperature

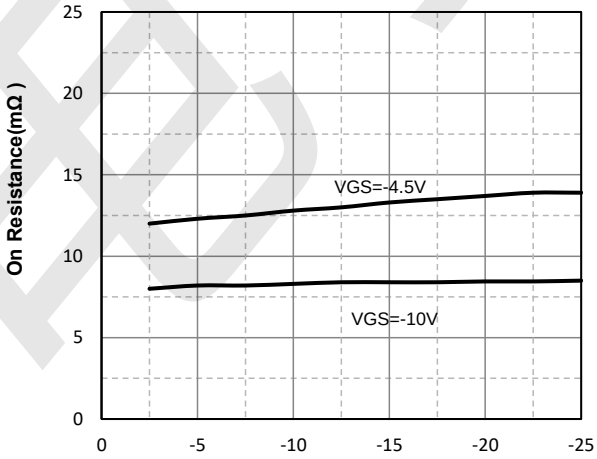


Fig4. On-Resistance Vs. Drain-Source Current

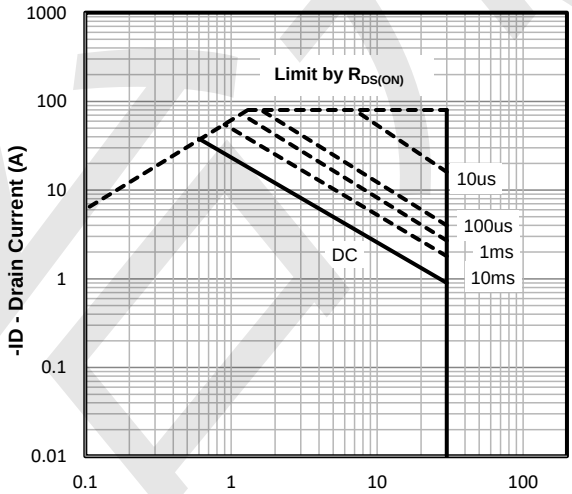


Fig5. Maximum Safe Operating Area

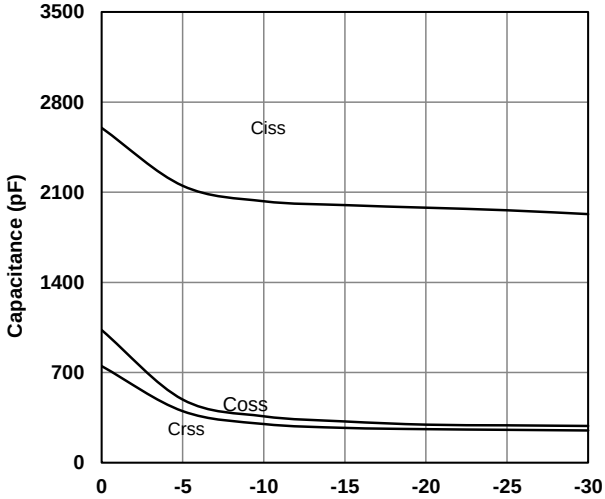
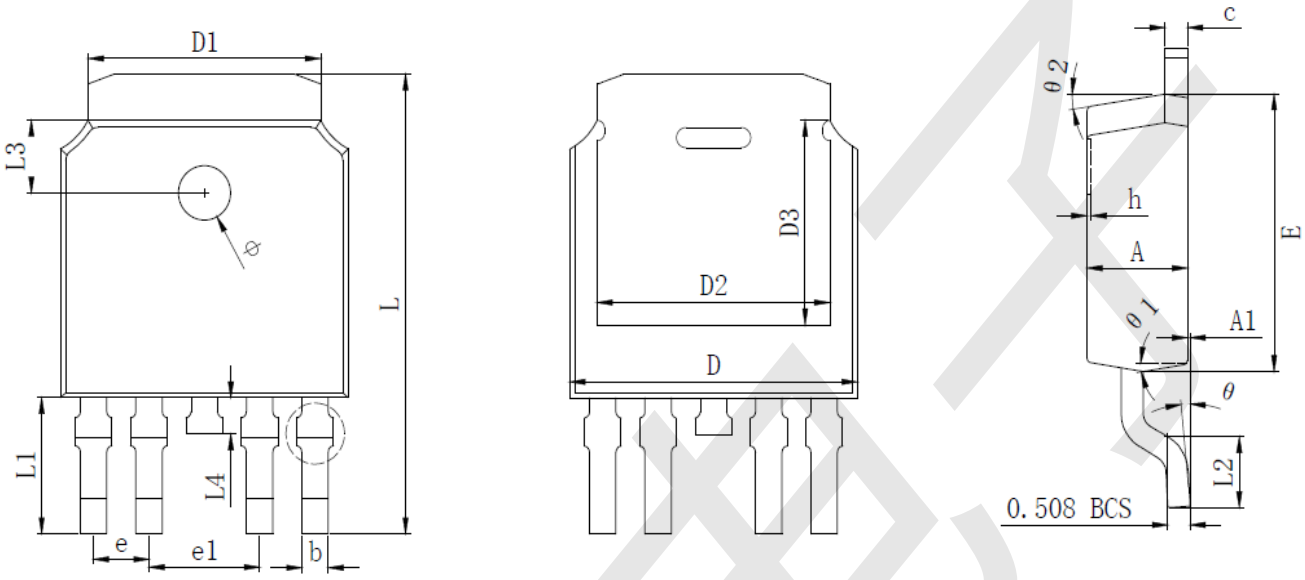
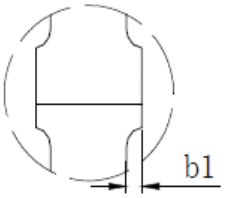


Fig6 Typical Capacitance Vs.Drain-Source Voltage

TO252-4L Package Information





Symbol	Dimensions in Millimeters(mm)		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	0.550	0.650	0.022	0.026
b1	0.000	0.120	0.000	0.005
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.334(REF)		0.210(REF)	
D2	5.346(REF)		0.210(REF)	
D3	4.490(REF)		0.177(REF)	
E	6.000	6.200	0.236	0.244
e	1.270(TYP)		0.050(TYP)	
e1	2.540(TYP)		0.100(TYP)	
h	0.000	0.200	0.000	0.008
L	9.900	10.300	0.390	0.406
L1	2.988(REF)		0.117(REF)	
L2	1.400	1.700	0.055	0.067
L3	1.600(REF)		0.063(REF)	
L4	0.700	0.900	0.028	0.035
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
θ1	9°(TYP)		9°(TYP)	
θ2	9°(TYP)		9°(TYP)	