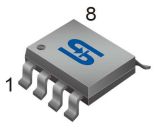
TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TSM4513D

Complementary Enhancement MOSFET

SOP-8



Pin Definition:

1. Source 1
2. Gate 1
3. Source 2
4. Gate 2
8. Drain 1
7. Drain 1
6. Drain 2
5. Drain 2

MOSFET PRODUCT SUMMARY

	V_{DS} (V)	$R_{DS(on)}$(mΩ)	I_D (A)
N-Channel	20	14 @ V_{GS} = 4.5V	6
		16 @ V_{GS} = 2.5V	4
P-Channel	-20	18 @ V_{GS} = -4.5V	-6
		25 @ V_{GS} = -2.5V	-4

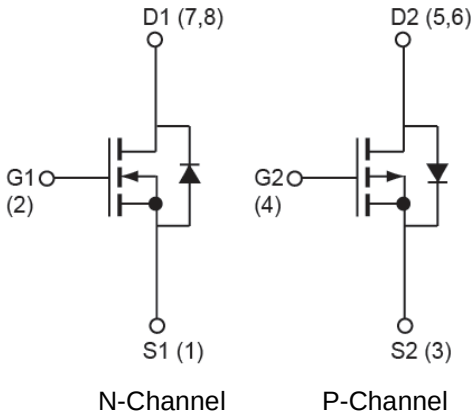
Features

- Low $R_{DS(ON)}$ Provides Higher Efficiency.
- Extends Battery Life
- Fast Switching Speed

Application

- Portable and battery powered products
- PC Peripherals

Block Diagram



N-Channel P-Channel

Ordering Information

Part No.	Package	Packing
TSM4513DCS RLG	SOP-8	2.5Kpcs / 13” Reel

Note: “G” denote for Halogen Free Product

Absolute Maximum Rating (T_A=25°C unless otherwise noted)

Parameter		Symbol	N-CH Limit	P-CH Limit	Unit
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±12	±12	V
Continuous Drain Current (Note 1)	T_A=25°C	I_D	6	-6	A
	T_A=70°C		4	-4	
Pulsed Drain Current (Note 2)		I_{DM}	30	-30	A
Power Dissipation @ T_A=25°C		P_D	2		W
Operating Junction Temperature		T_J	150		°C
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 ~ +150		°C

Thermal Performance

Parameter	Symbol	N-CH Limit	P-CH Limit	Unit
Junction to Ambient Thermal Resistance	$R\Theta_{JA}$	62.5	62.5	°C/W
Junction to Lead Thermal Resistance	$R\Theta_{JL}$	40	40	°C/W

Notes 1: Surface Mounted on FR4 Board using 1 inch sq pad size, t ≤ 5sec.

Notes 2: Pulse width limited by the Maximum junction temperature

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Electrical Specifications (T_A=25°C unless otherwise noted)

Parameter	Conditions	Symbol		Min	Typ	Max	Unit
Static							
Drain-Source Breakdown Voltage	V_{GS} =0V, I_D = 250uA	BV_{DSS}	N-CH	20	--	--	V
	V_{GS} =0V, I_D =-250uA		P-CH	-20	--	--	
Gate Threshold Voltage	V_{DS} =V_{GS}, I_D = 250μA	$V_{GS(TH)}$	N-CH	0.6	--	1.4	V
	V_{DS} =V_{GS}, I_D =-250μA		P-CH	-0.6	--	-1.4	
Gate Body Leakage	V_{GS} = ±12V, V_{DS} =0V	I_{GSS}	N-CH	--	--	±100	nA
	V_{GS} = ±12V, V_{DS} =0V		P-CH	--	--	±100	
Zero Gate Voltage Drain Current	V_{DS} =16V, V_{GS} =0V	I_{DSS}	N-CH	--	--	1	μA
	V_{DS} =-16V, V_{GS} =0V		P-CH	--	--	-1	
Drain-Source On-State Resistance[a]	V_{GS} =4.5V, I_D =6A	$R_{DS(ON)}$	N-CH	--	11	14	mΩ
	V_{GS} =-4.5V, I_D =6A		P-CH	--	15	18	
	V_{GS} =2.5V, I_D =4A		N-CH	--	13	16	
	V_{GS} =-2.5V, I_D =-4A		P-CH		21	25	
Dynamic[b]							
Total Gate Charge	N-Channel V_{DS} =15V, I_D =6A, V_{GS} =4.5V P-Channel V_{DS} =-10V, I_D =-6A, V_{GS} =-4.5V	Q_g	N-CH	--	16.3	--	nC
			P-CH	--	67.8	--	
Gate-Source Charge		Q_{gs}	N-CH	--	3.18	--	
			P-CH	--	7.86	--	
Gate-Drain Charge		Q_{gd}	N-CH	--	3.89	--	
			P-CH	--	12.2	--	
Input Capacitance	N-Channel V_{DS} =10V, V_{GS} = 0V, f = 1.0MHz P-Channel V_{DS} =-10V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	N-CH	--	1517	--	pF
			P-CH	--	5899	--	
Output Capacitance		C_{oss}	N-CH	--	278	--	
			P-CH	--	634	--	
Reverse Transfer Capacitance		C_{rss}	N-CH	--	98.6	--	
			P-CH	--	476	--	
Switching[b]							
Turn-On Delay Time	N-Channel V_{DD} =10V, I_D = 1A, V_{GEN} =5V, R_G = 3Ω P-Channel V_{DD} =-10V, I_D = -1A, V_{GEN} =-4.5V, R_G = 6Ω	$t_{d(on)}$	N-CH	--	13.7	--	nS
			P-CH	--	26.9	--	
Turn-On Rise Time		t_r	N-CH	--	12	--	
			P-CH	--	17.9	--	
Turn-Off Delay Time		$t_{d(off)}$	N-CH	--	40	--	
			P-CH	--	297	--	
Turn-Off Fall Time		t_f	N-CH	--	6.2	--	
			P-CH	--	102	--	

Notes:

a. Pulse test: PW ≤300μS, duty cycle ≤2%

b. For DESIGN AID ONLY, not subject to production testing.

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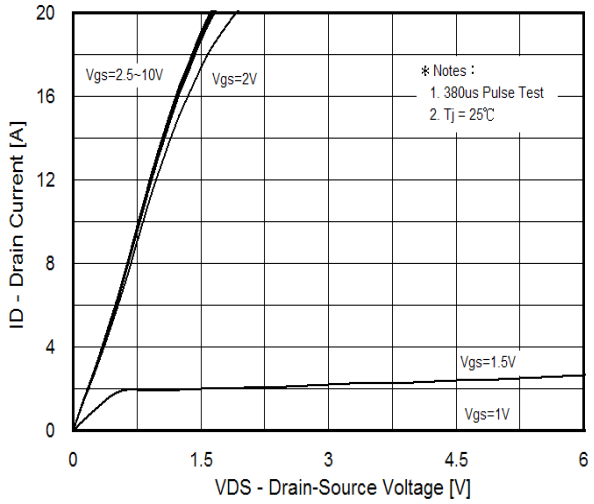
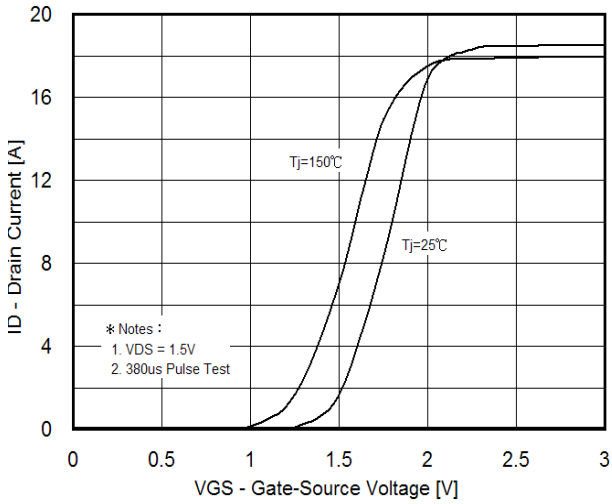
N-Channel Electrical Characteristics Curve (T_A=25°C, unless otherwise noted)

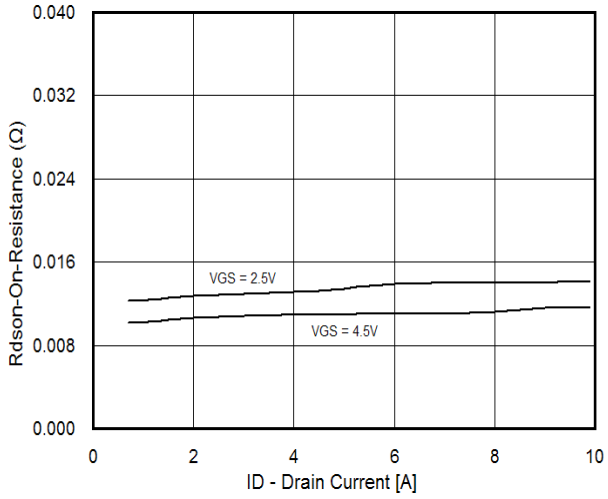
Output Characteristics



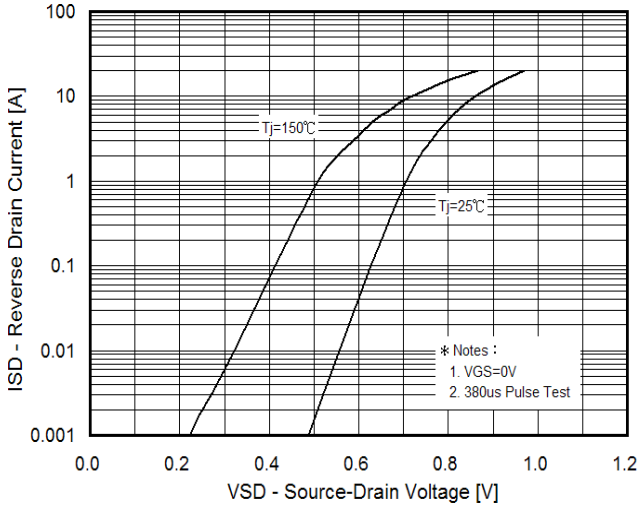
Transfer Characteristics



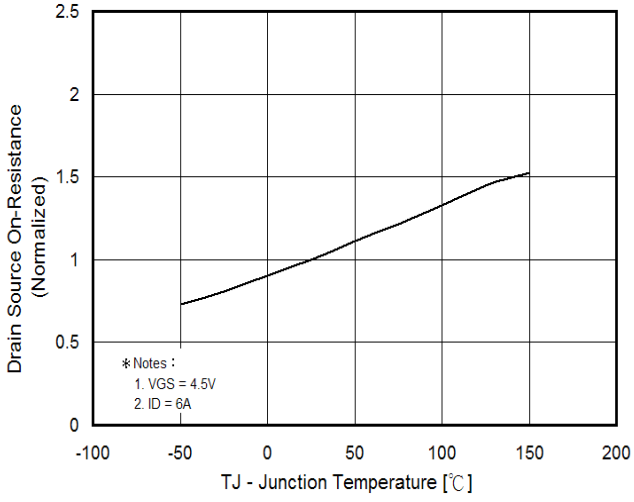
On-Resistance vs. Drain Current



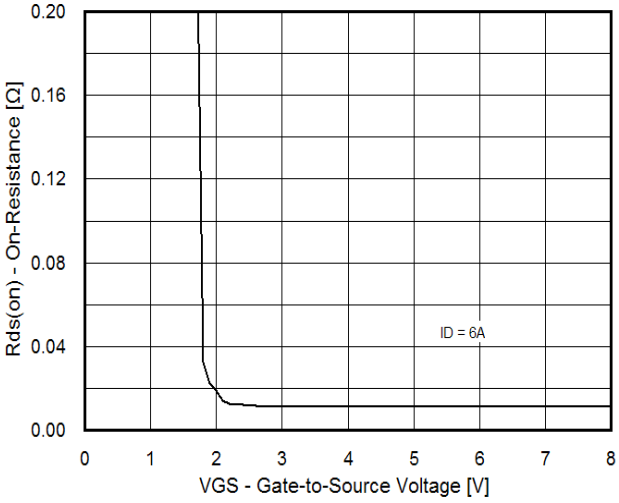
Source-Drain Diode Forward Voltage



On-Resistance vs. Junction Temperature



On-Resistance vs. Gate-Source Voltage



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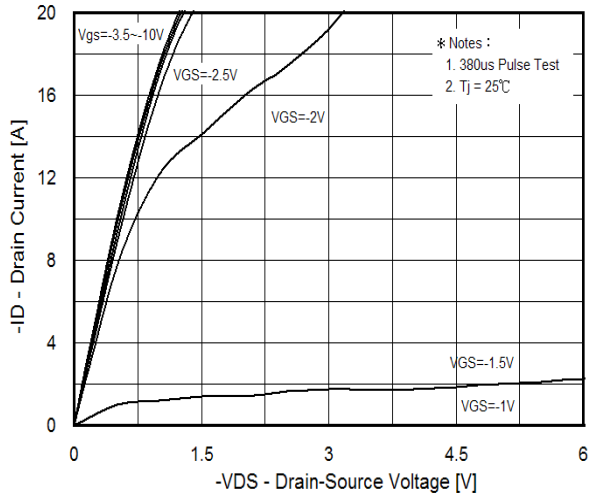
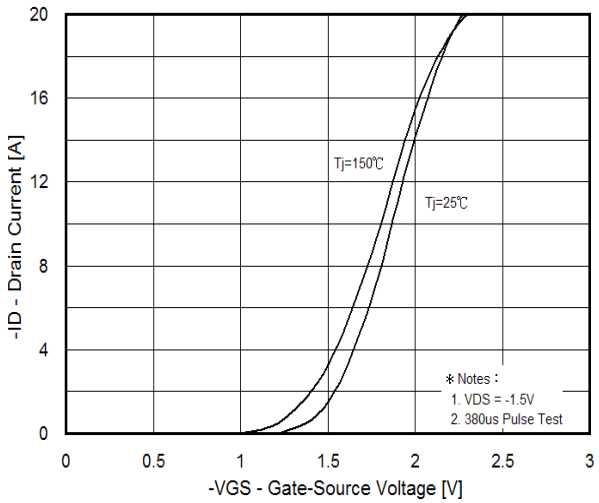
P-Channel Electrical Characteristics Curve (T_A=25°C, unless otherwise noted)

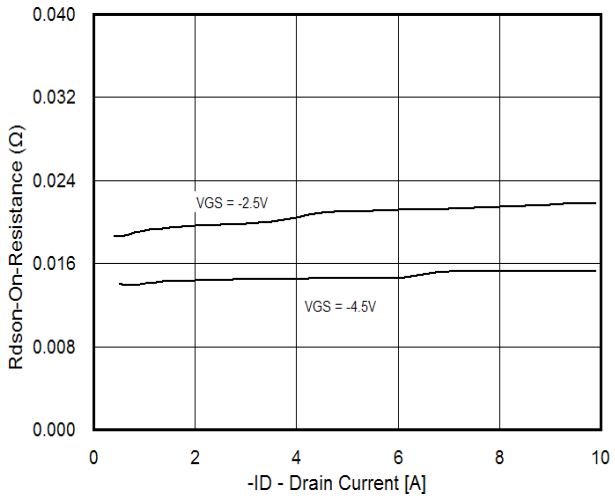
Output Characteristics



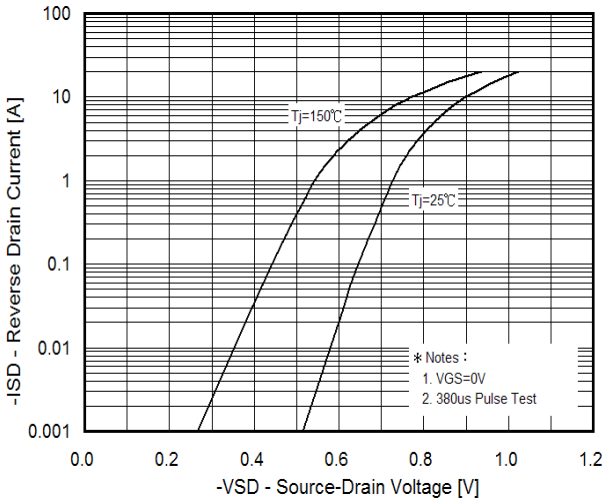
Transfer Characteristics



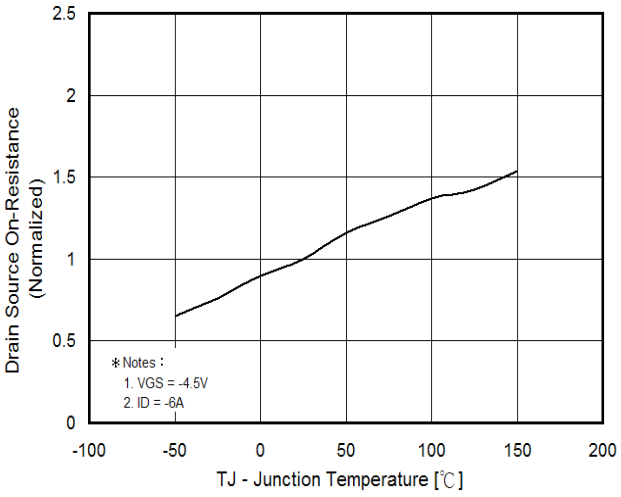
On-Resistance vs. Drain Current



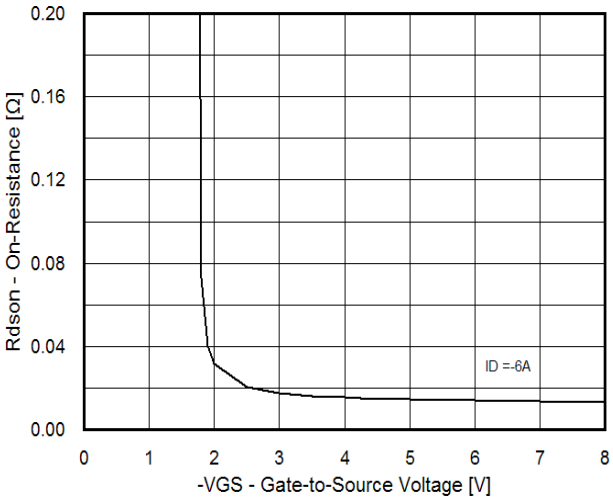
Source-Drain Diode Forward Voltage



On-Resistance vs. Junction Temperature



On-Resistance vs. Gate-Source Voltage



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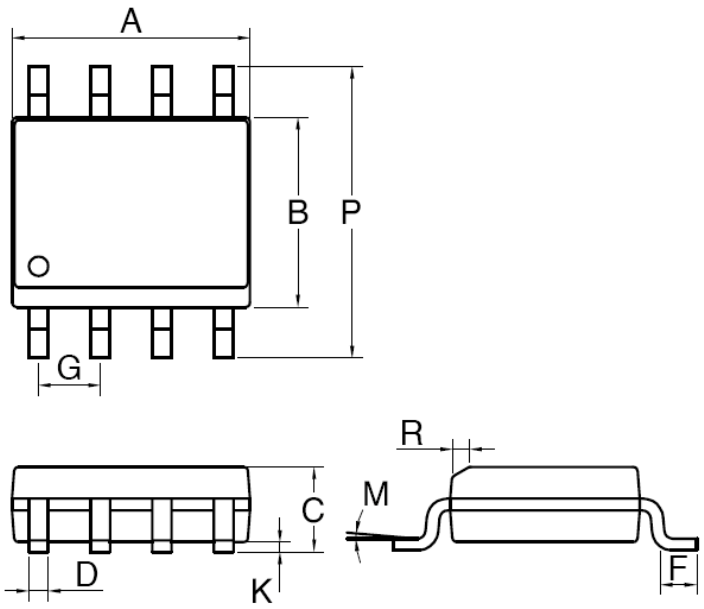
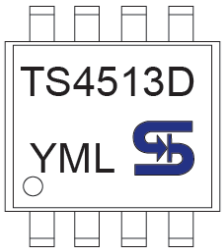
SOP-8 Mechanical Drawing



SOP-8 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0º	7º	0º	7º
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

Marking Diagram



Y = Year Code

M = Month Code for Halogen Free Product
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apl, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)

L = Lot Code

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