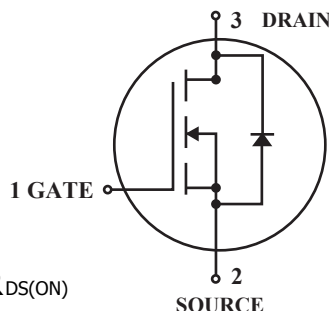


Surface Mount N-Channel Enhancement Mode POWER MOSFET

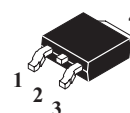
Pb Lead(Pb)-Free



DRAIN CURRENT
14 AMPERES
DRAIN SOURCE VOLTAGE
60 VOLTAGE

Features:

- *Super High Dense Cell Design For Low $R_{DS(ON)}$
 $R_{DS(ON)} < 80m\Omega @ V_{GS} = 10V$
- *Simple Drive Requirement
- *Lower On-resistance
- *Fast Switching Characteristic
- *TO-252 Package



1. GATE
2.4 DRAIN
3. SOURCE

D-PAK / (TO-252)

Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Specified)

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current, ($V_{GS}@10V, T_C=25^\circ C$) , ($V_{GS}@10V, T_C=100^\circ C$)	I_D	14 9	A
Pulsed Drain Current ¹	I_{DM}	40	
Total Power Dissipation ($T_C=25^\circ C$)	P_D	27	W
Maximum Thermal Resistace Junction-case	$R_{\theta JC}$	4.5	$^\circ C/W$
Maximum Thermal Resistace Junction-ambient	$R_{\theta JA}$	110	$^\circ C/W$
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ C$

Device Marking

WTD9973=9973

Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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Static

Drain-Source Breakdown Voltage $V_{GS}=0, I_D=250\mu\text{A}$	BV_{DSS}	60	-	-	V
Gate-Source Threshold Voltage $V_{DS}=V_{GS}, I_D=250\mu\text{A}$	$V_{GS(Th)}$	1.0	-	3.0	
Gate-Source Leakage current $V_{GS}=\pm 20\text{V}$	I_{GSS}	-	-	± 100	nA
Drain-Source Leakage Current ($T_j=25^\circ\text{C}$) $V_{DS}=60\text{V}, V_{GS}=0$	I_{DSS}	-	-	1	μA
Drain-Source Leakage Current ($T_j=150^\circ\text{C}$) $V_{DS}=48\text{V}, V_{GS}=0$		-	-	25	
Drain-Source On-Resistance $V_{GS}=10\text{V}, I_D=9\text{A}$ $V_{GS}=4.5\text{V}, I_D=6\text{A}$	$R_{DS(on)}$	- -	- -	80 100	$\text{m}\Omega$
Forward Transconductance $V_{DS}=10\text{V}, I_D=9\text{A}$	g_{fs}	-	8.6	-	S

Dynamic

Input Capacitance $V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1.0\text{MHz}$	C_{iss}	-	720	1150	pF
Output Capacitance $V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1.0\text{MHz}$	C_{oss}	-	77	-	
Reverse Transfer Capacitance $V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1.0\text{MHz}$	C_{rss}	-	45	-	

Switching

Turn-on Delay Time ² $V_{DS}=30V, V_{GS}=10V, I_D=9A, R_D=3.3\Omega, R_G=3.3\Omega$	$t_{d(on)}$	-	7	-	ns
Rise Time $V_{DS}=30V, V_{GS}=10V, I_D=9A, R_D=3.3\Omega, R_G=3.3\Omega$	t_r	-	15	-	
Turn-off Delay Time $V_{DS}=30V, V_{GS}=10V, I_D=9A, R_D=3.3\Omega, R_G=3.3\Omega$	$t_{d(off)}$	-	16	-	
Fall Time $V_{DS}=30V, V_{GS}=10V, I_D=9A, R_D=3.3\Omega, R_G=3.3\Omega$	t_f	-	3	-	
Total Gate Charge ² $V_{DS}=48V, V_{GS}=4.5V, I_D=9A$	Q_g	-	8	13	nC
Gate-Source Charge $V_{DS}=48V, V_{GS}=4.5V, I_D=9A$	Q_{gs}	-	3	-	
Gate-Source Change $V_{DS}=48V, V_{GS}=4.5V, I_D=9A$	Q_{gd}	-	4	-	

Source-Drain Diode Characteristics

Forward On Voltage ² $V_{GS}=0V, I_S=14A$	V_{SD}	-	-	1.2	V
Reverse Recovery Time $V_{GS}=0V, I_S=9A, dl/dt=100A/\mu s$	T_{rr}	-	28	-	ns
Reverse Recovery Charge $V_{GS}=0V, I_S=9A, dl/dt=100A/\mu s$	Q_{rr}	-	27	-	nC

Note: 1. Pulse width limited by safe operating area.
2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

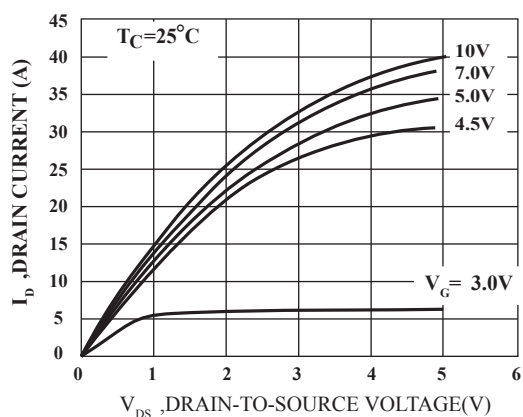


FIG.1 Typical Output Characteristics

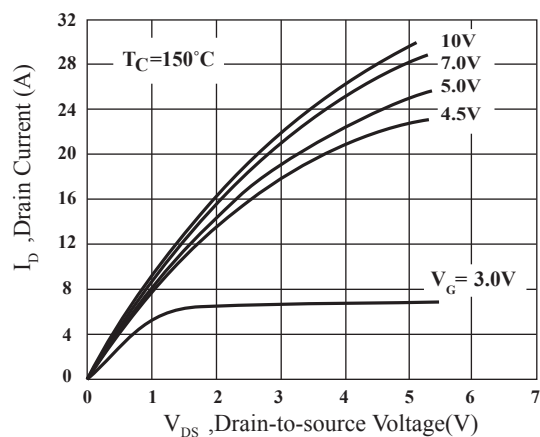


Fig.2 Typical Output Characteristics

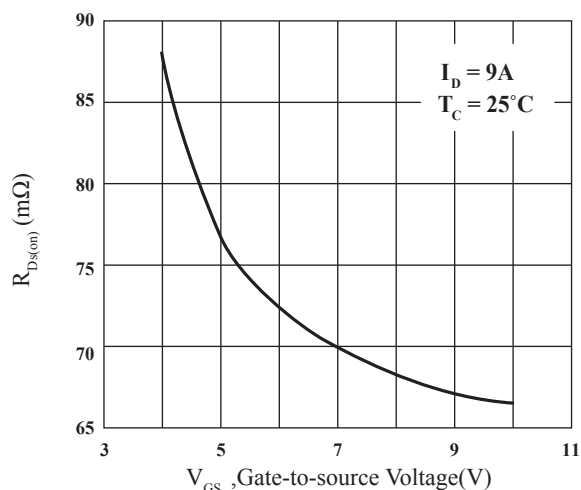


Fig.3 On-Resistance v.s. Gate Voltage

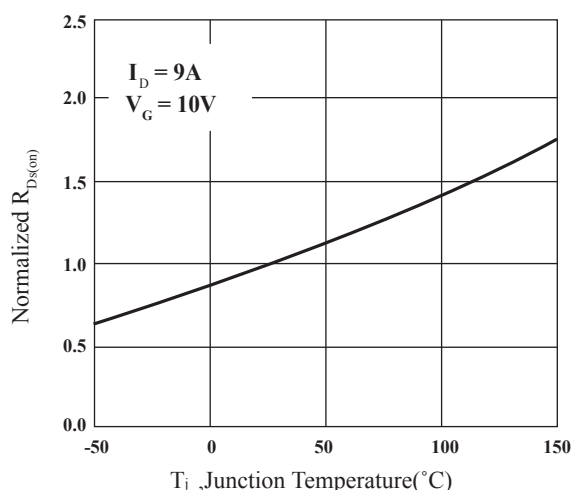


Fig.4 Normalized OnResistance

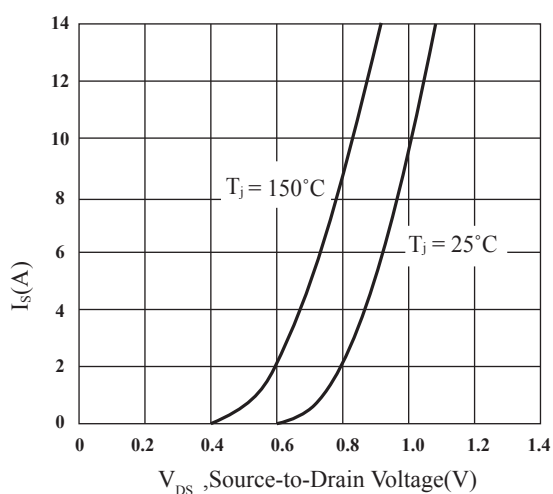


Fig.5 Forward Characteristics of Reverse Diode

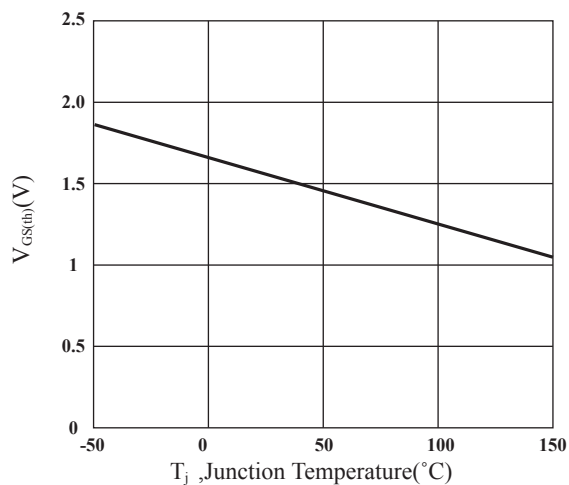


Fig.6 Gate Threshold Voltage v.s. Junction Temperature

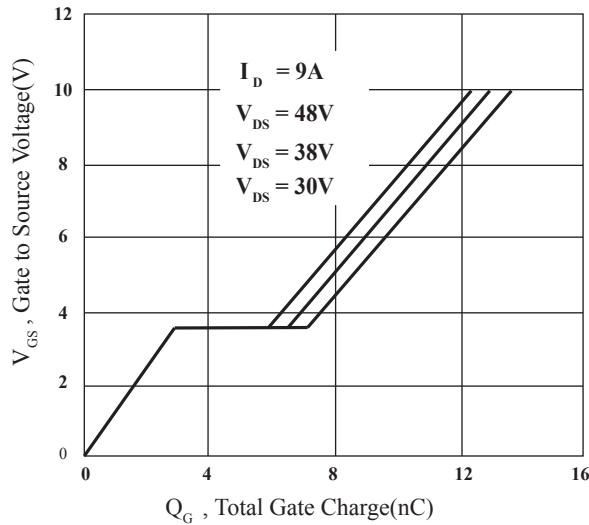


Fig 7. Gate Charge Characteristics

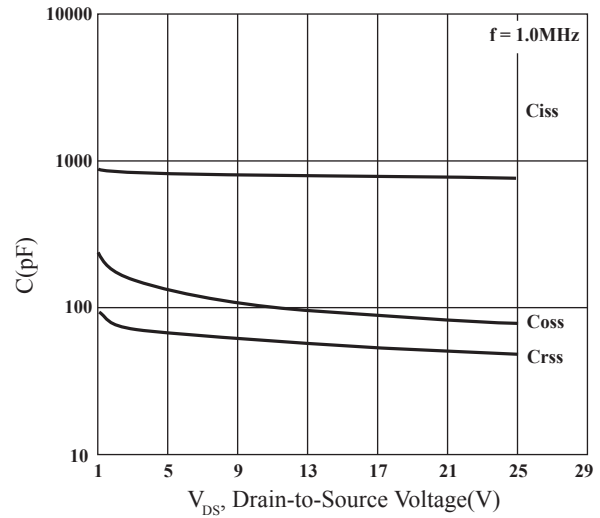


Fig 8. Typical Capacitance Characteristics

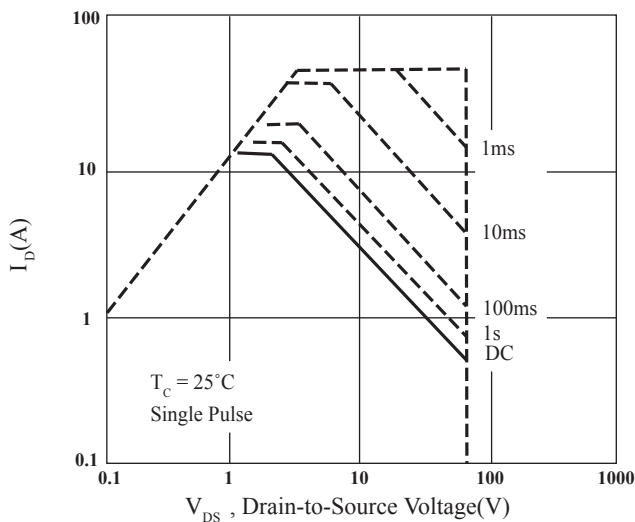


Fig 9. Maximum Safe Operation Area

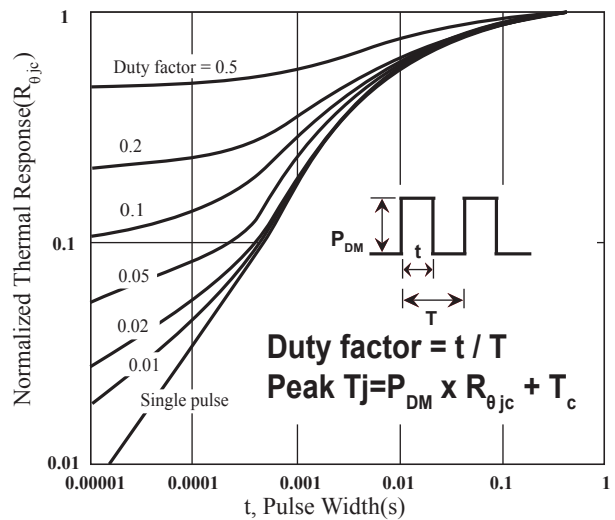


Fig 10. Effective Transient Thermal Impedance

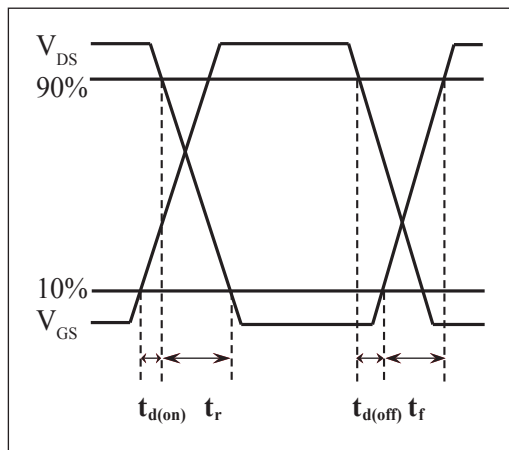


Fig 11. Switching Time Circuit

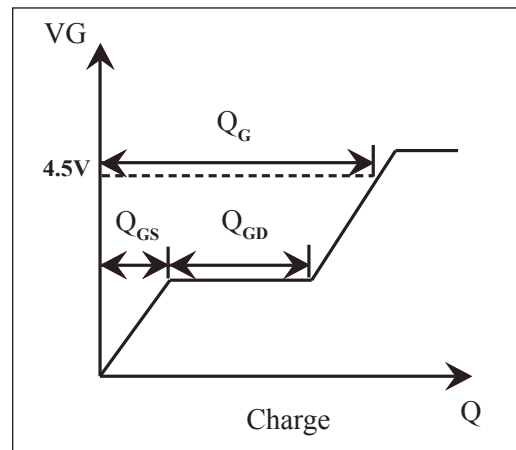
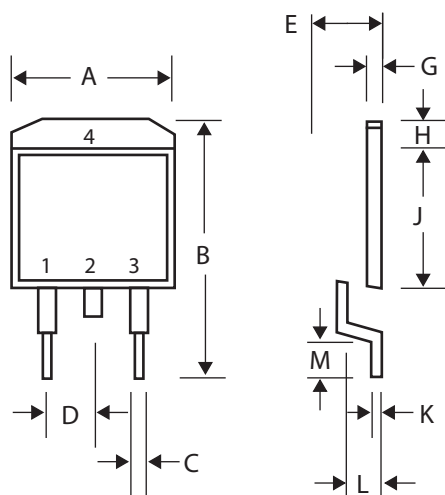


Fig.12 Gate Charge Waveform

D-PAK / (TO-252) Outline Dimension

Unit:mm



D-PAK		
Dim	Min	Max
A	6.40	6.80
B	9.00	10.00
C	0.50	0.80
D	-	2.30
E	2.20	2.50
G	0.45	0.55
H	1.00	1.60
J	5.40	5.80
K	0.30	0.64
L	0.70	1.70
M	0.90	1.50