

P-Channel Enhancement Mode Power MOSFET

Description

The 4953 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

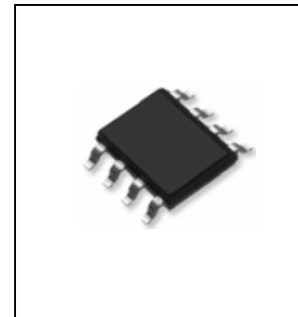
General Features

- $V_{DS} = -30V, I_D = -5.1A$
 $R_{DS(ON)} < 105m\Omega @ V_{GS} = -4.5V$
 $R_{DS(ON)} < 55m\Omega @ V_{GS} = -10V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

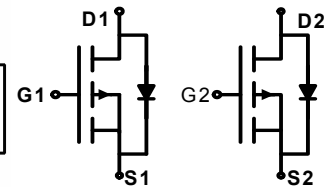
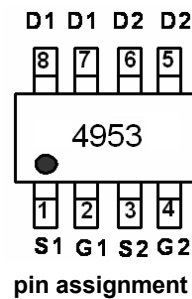
Application

- PWM applications
- Load switch
- Power management

4953



SOP-8 top view



Schematic diagram

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-5.1	A
Drain Current-Pulsed (Note 1)	I_{DM}	-20	A
Maximum Power Dissipation	P_D	2	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	50	$^\circ C/W$
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Electrical Characteristics ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-30	-33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -24V, V_{GS} = 0V$	-	-	-1	μA

4953

Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-5.1A$	-	48	55	m Ω
		$V_{GS}=-4.5V, I_D=-4.2A$	-	73	105	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-15V, I_D=-4.5A$	4	7	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{ISS}	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	520	-	PF
Output Capacitance	C_{OSS}		-	130	-	PF
Reverse Transfer Capacitance	C_{RSS}		-	70	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-1A,$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	7	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14	-	nS
Turn-Off Fall Time	t_f		-	9	-	nS
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-5.1A, V_{GS}=-10V$	-	12	-	nC
Gate-Source Charge	Q_{gs}		-	2.2	-	nC
Gate-Drain Charge	Q_{gd}		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-1.7A$	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

4953

Typical Electrical and Thermal Characteristics

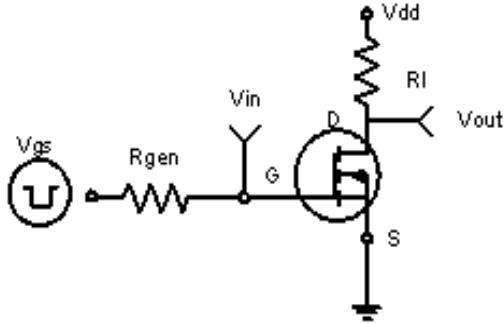


Figure 1: Switching Test Circuit

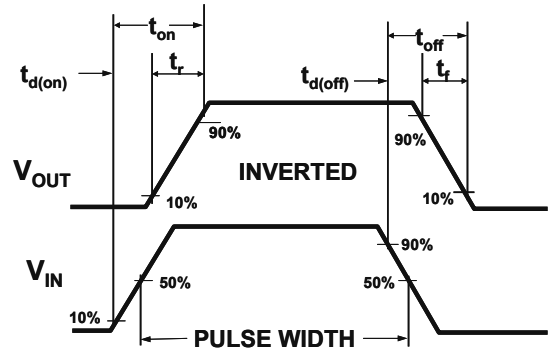


Figure 2: Switching Waveforms

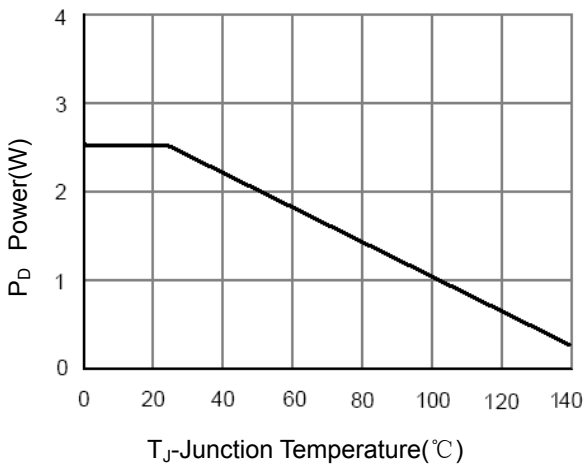


Figure 3 Power Dissipation

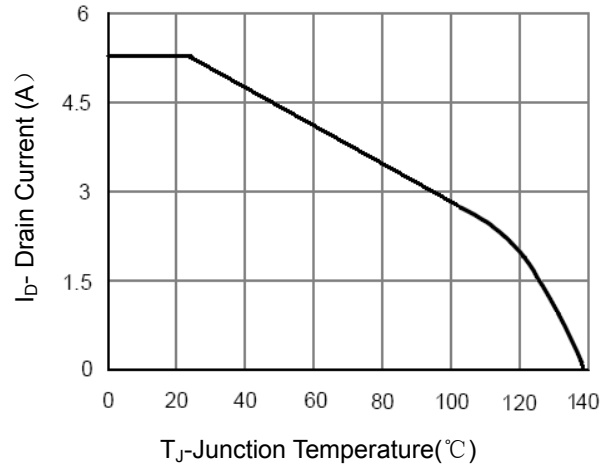


Figure 4 Drain Current

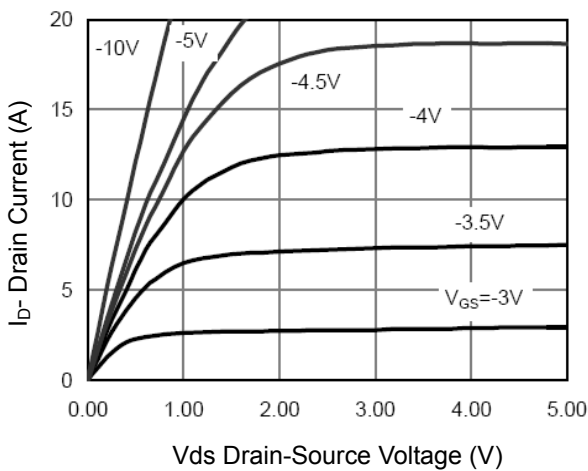


Figure 5 Output Characteristics

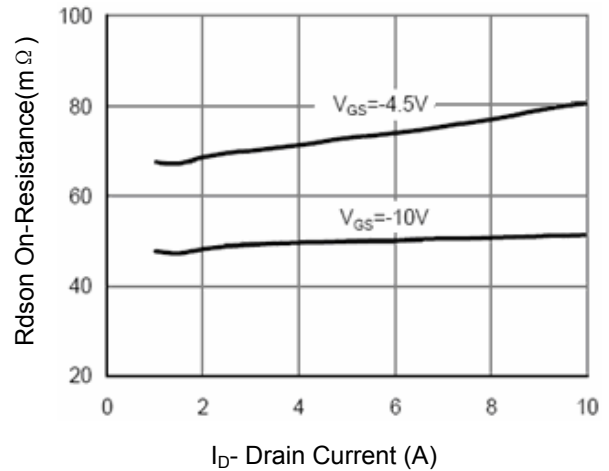


Figure 6 Drain-Source On-Resistance

4953

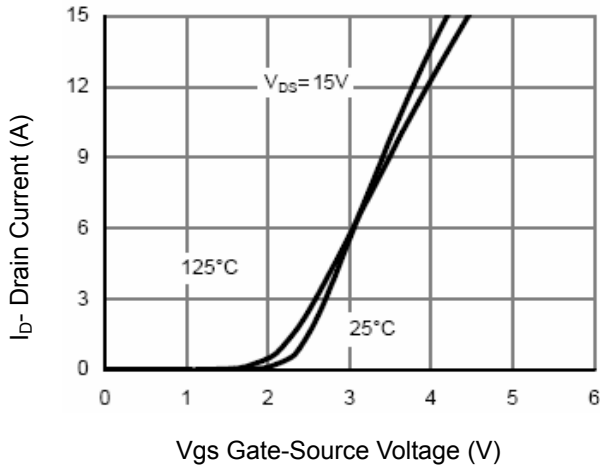


Figure 7 Transfer Characteristics

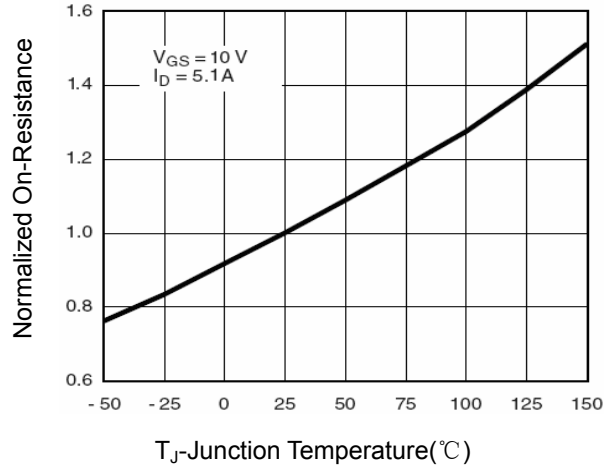


Figure 8 Drain-Source On-Resistance

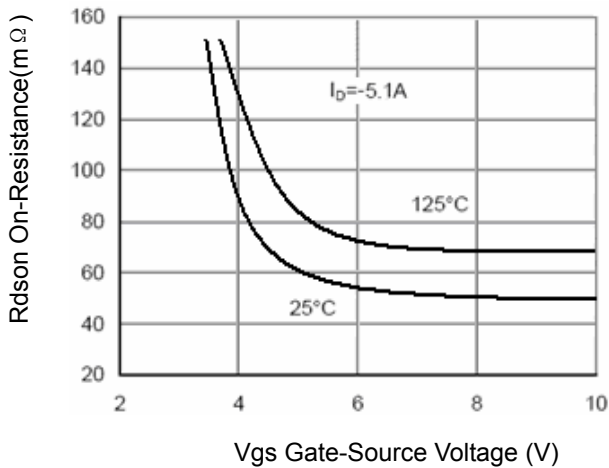


Figure 9 Rdson vs Vgs

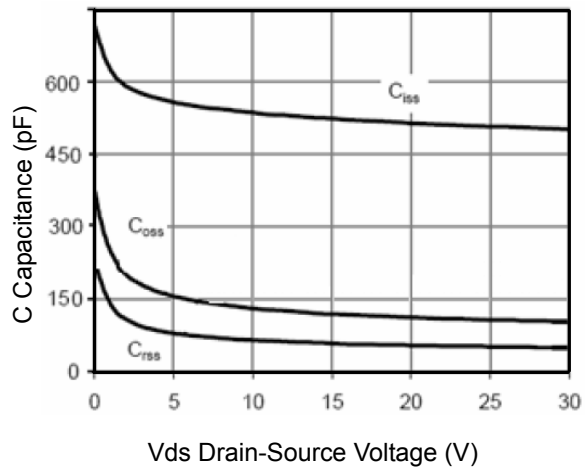


Figure 10 Capacitance vs Vds

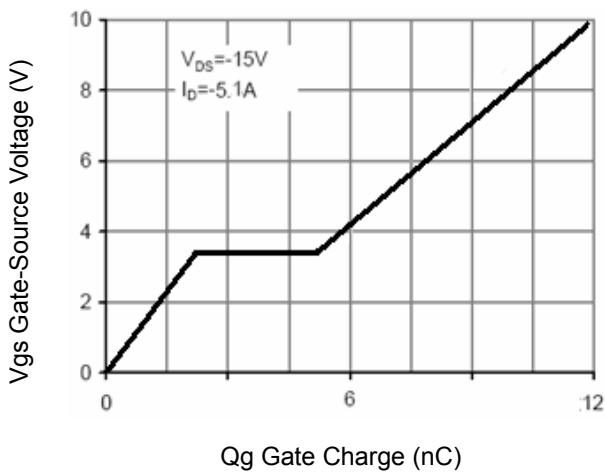


Figure 11 Gate Charge

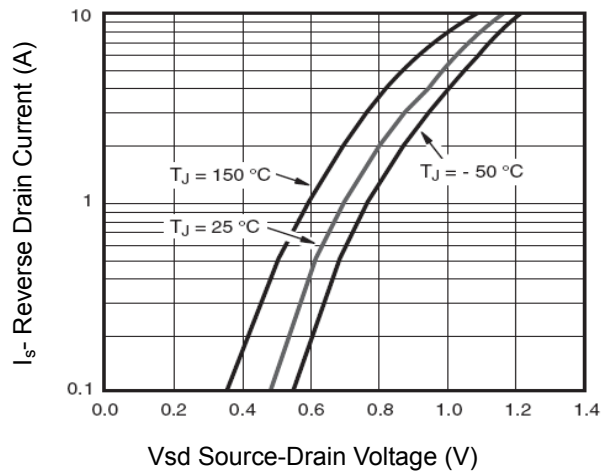


Figure 12 Source- Drain Diode Forward

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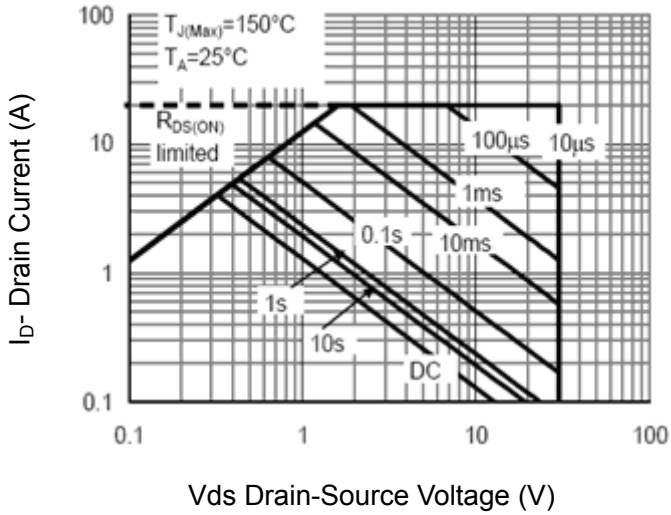


Figure 13 Safe Operation Area

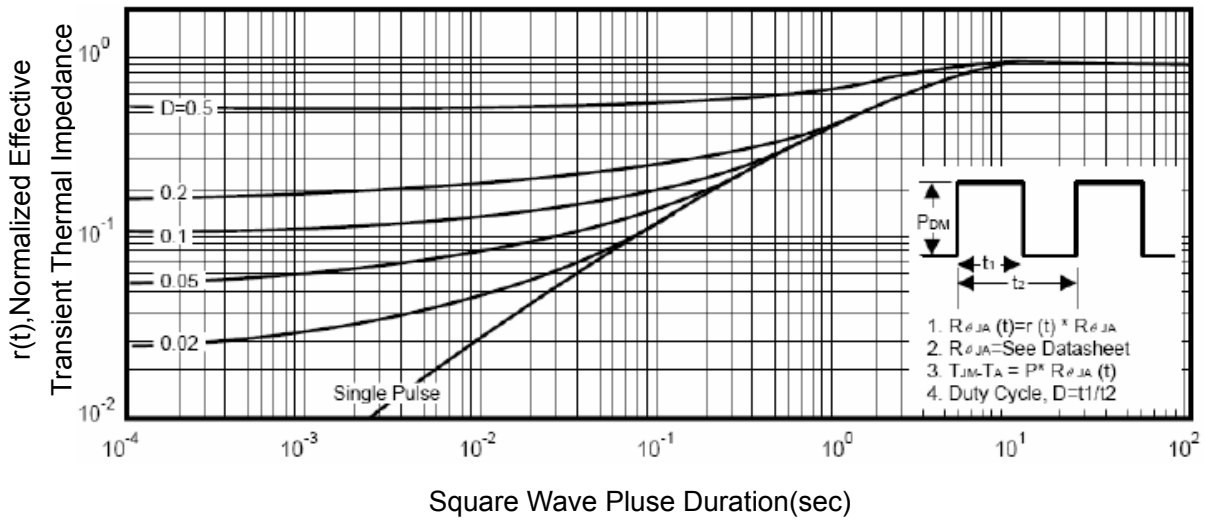


Figure 14 Normalized Maximum Transient Thermal Impedance