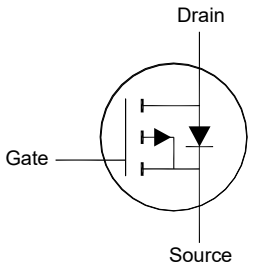
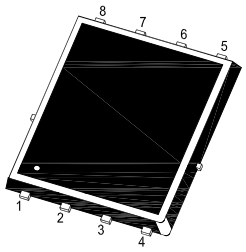
WTM504P150LS-AH

P-Channel Enhancement Mode MOSFET

Features

- AEC-Q101 Qualified
- Low $R_{DS(ON)}$
- Surface-mounted package
- Halogen and Antimony Free(HAF), RoHS compliant





1.Source 2.Source 3.Source 4.Gate
5.Drain 6.Drain 7.Drain 8.Drain
DFN5060 Plastic Package

Key Parameters

Parameter	Value	Unit
$-BV_{DSS}$	40	V
$R_{DS(ON)}$ Max	15 @ $-V_{GS}$ = 10 V	mΩ
	18 @ $-V_{GS}$ = 4.5 V	
$-V_{GS(th)}$ typ	1.5	V
Q_g typ	59 @ $-V_{GS}$ = 10 V	nC

Absolute Maximum Ratings (at T_a = 25℃ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		$-V_{DS}$	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current	T_c = 25℃	$-I_D$	40	A
	T_c = 100℃		25	
Peak Drain Current [1]		$-I_{DM}$	160	A
Avalanche Current		$-I_{AS}$	32	A
Avalanche Energy [2]		E_{AS}	51	mJ
Power Dissipation	T_c = 25℃	P_D	35.7	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	- 55 to + 150	℃

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.5	℃/W
Thermal Resistance from Junction to Ambient [3]	$R_{\theta JA}$	55	℃/W

[1] Pulse Test: Pulse Width ≤ 100 μs, Duty Cycle ≤ 2%, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ = 150°C.

[2] Limited by $T_{J(MAX)}$, starting T_J = 25 °C, L = 0.1 mH, R_g = 25 Ω, $-I_{AS}$ = 32 A, $-V_{GS}$ = 10 V.

[3] Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.

Dated: 25/03/2021 SG1F Rev: 01

Characteristics at T_a = 25℃ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $-I_D$ = 250 µA	$-V_{(BR)DSS}$	40	-	-	V
Drain-Source On-State Current at $-V_{DS}$ = 32 V	$-I_{DSS}$	-	-	1	µA
Gate-Source Leakage Current at V_{GS} = ± 20 V	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at V_{DS} = V_{GS}, $-I_D$ = 250 µA	$-V_{GS(th)}$	1	-	2.5	V
Drain-Source On-State Resistance at $-V_{GS}$ = 10 V, $-I_D$ = 10 A at $-V_{GS}$ = 4.5 V, $-I_D$ = 8 A	$R_{DS(ON)}$	- -	12 -	15 18	mΩ
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS}$ = 5 V, $-I_D$ = 10 A	g_{fs}	-	32.4	-	S
Gate resistance at V_{DS} = 0 V, f = 1 MHz	R_g	-	2.2	-	Ω
Input Capacitance at V_{GS} = 0 V, $-V_{DS}$ = 20 V, f = 1 MHz	C_{iss}	-	3538	-	pF
Output Capacitance at V_{GS} = 0 V, $-V_{DS}$ = 20 V, f = 1 MHz	C_{oss}	-	265	-	pF
Reverse Transfer Capacitance at V_{GS} = 0 V, $-V_{DS}$ = 20 V, f = 1 MHz	C_{rss}	-	178	-	pF
Total Gate Charge at $-V_{GS}$ = 10 V, $-V_{DS}$ = 20 V, $-I_D$ = 10 A at $-V_{GS}$ = 4.5 V, $-V_{DS}$ = 20 V, $-I_D$ = 10 A	Q_g	- -	59 28	- -	nC
Gate-Source Charge at $-V_{GS}$ = 10 V, $-V_{DS}$ = 20 V, $-I_D$ = 10 A	Q_{gs}	-	10	-	nC
Gate-Drain Charge at $-V_{GS}$ = 10 V, $-V_{DS}$ = 20 V, $-I_D$ = 10 A	Q_{gd}	-	9	-	nC
Turn-On Delay Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 20 V, $-I_D$ = 10 A, R_g = 3.3 Ω	$t_{d(on)}$	-	19	-	ns
Turn-On Rise Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 20 V, $-I_D$ = 10 A, R_g = 3.3 Ω	t_r	-	25	-	ns
Turn-Off Delay Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 20 V, $-I_D$ = 10 A, R_g = 3.3 Ω	$t_{d(off)}$	-	26	-	ns
Turn-Off Fall Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 20 V, $-I_D$ = 10 A, R_g = 3.3 Ω	t_f	-	4	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S$ = 1 A, V_{GS} = 0 V	$-V_{SD}$	-	-	1.3	V
Body-Diode Continuous Current	$-I_S$	-	-	40	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	160	A
Body Diode Reverse Recovery Time at $-I_S$ = 10 A, di/dt = 100 A / µs	t_{rr}	-	16.5	-	ns
Body Diode Reverse Recovery Charge at $-I_S$ = 10 A, di/dt = 100 A / µs	Q_{rr}	-	10.3	-	nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristic

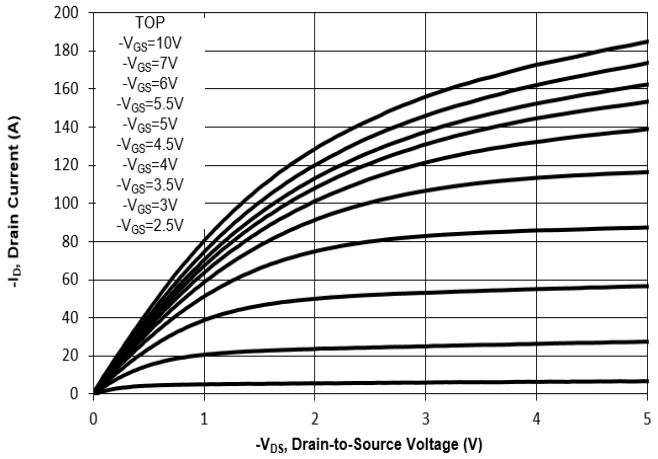


Fig. 2 Typical Transfer Characteristic

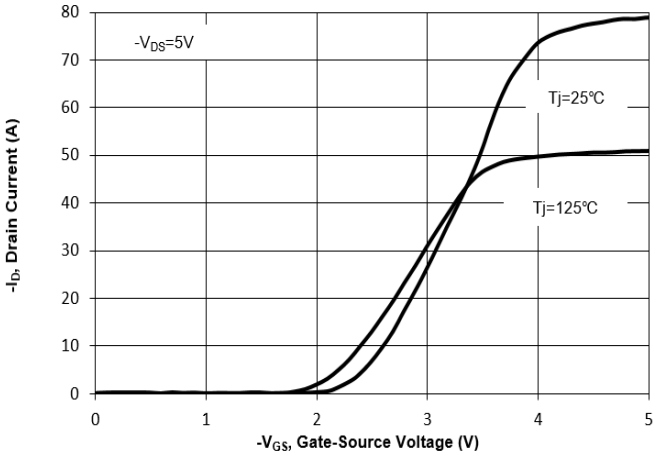


Fig. 3 On-Resistance vs. Drain Current

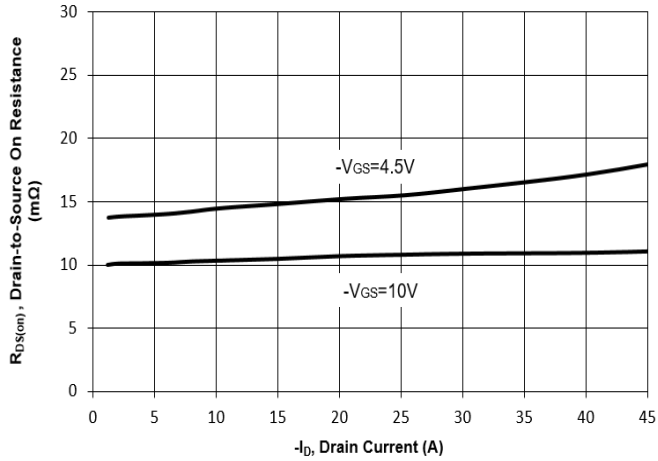


Fig. 4 On-Resistance vs. Gate Voltage

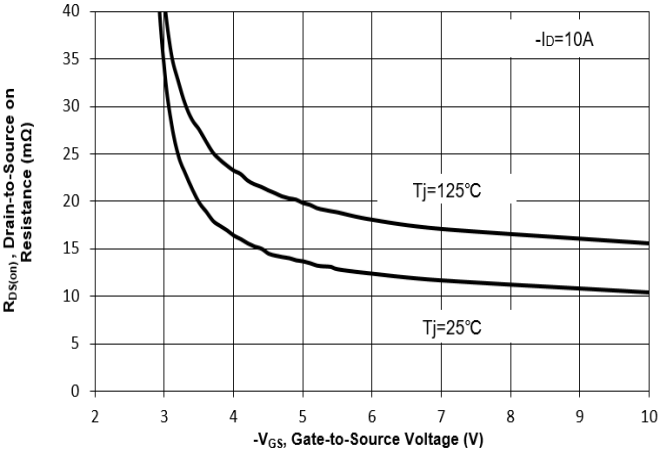


Fig. 5 On-Resistance vs.T_j

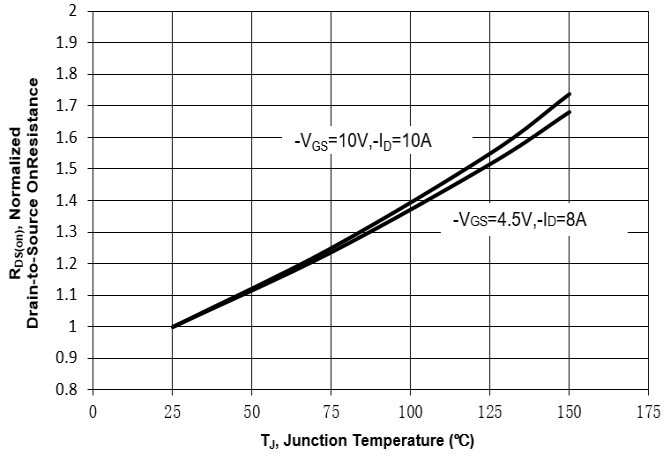
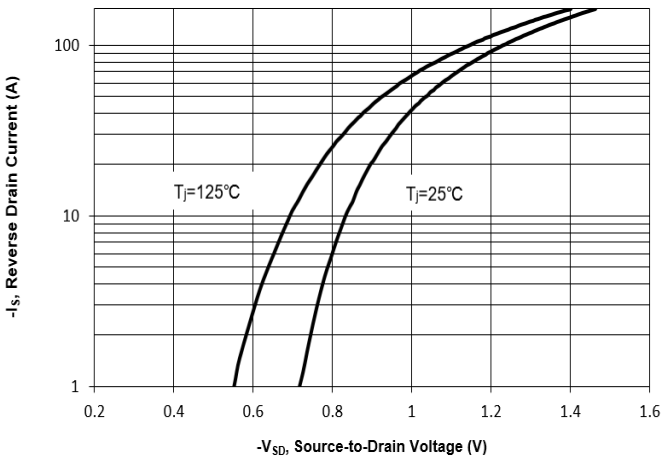


Fig. 6 Typical Body-Diode Forward Characteristic



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

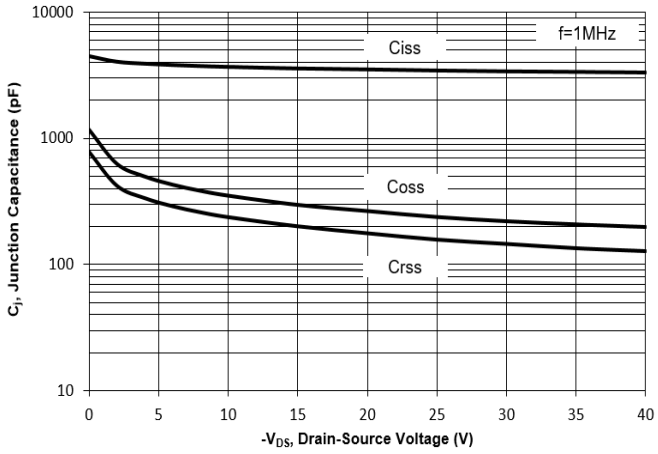


Fig. 8 Drain-Source Leakage Current vs. T_j

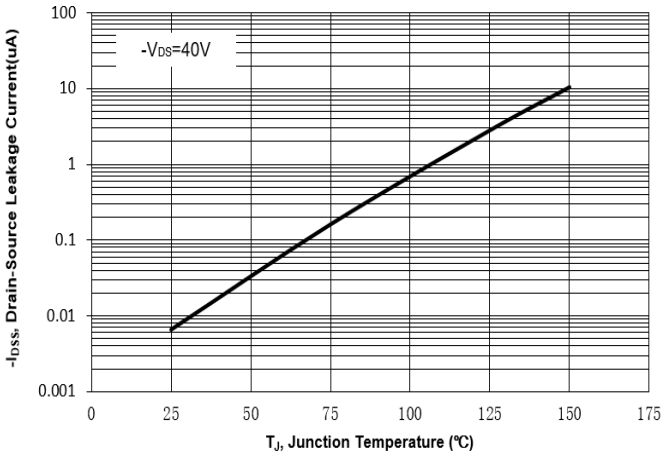


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

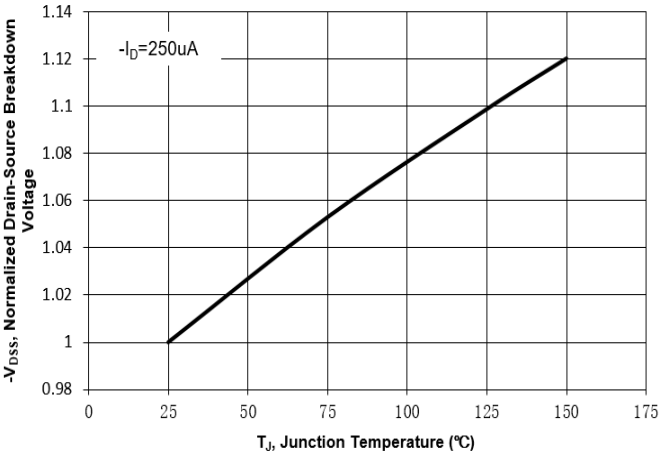


Fig. 10 Gate Threshold Variation vs. T_j

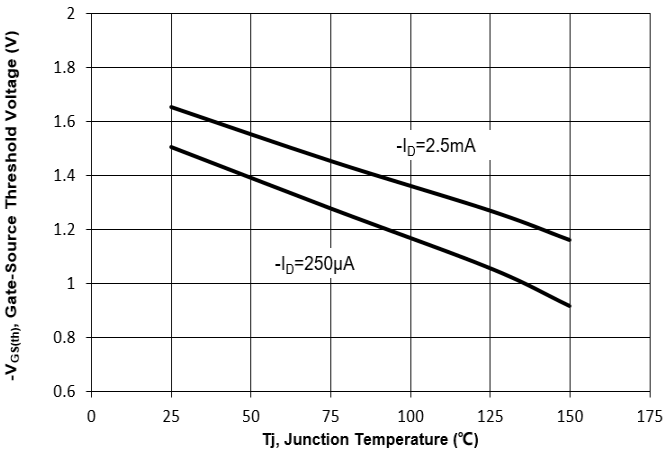


Fig. 11 Gate Charge

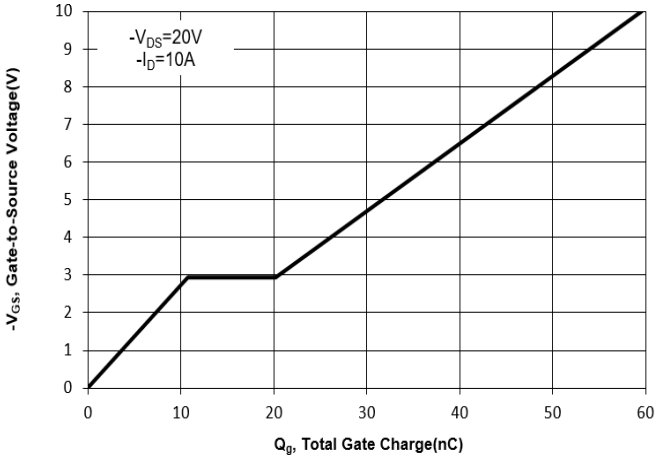
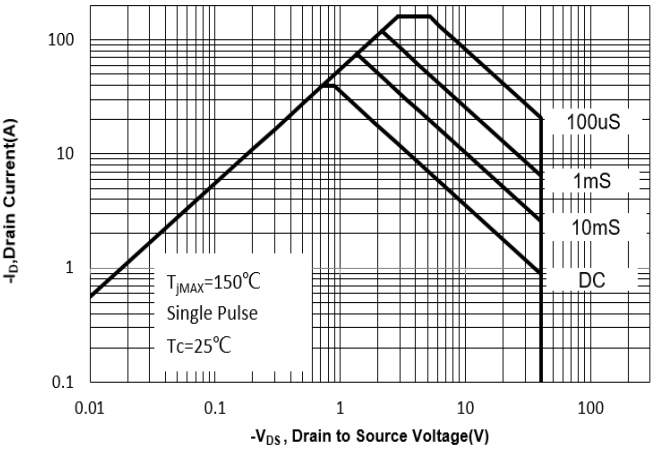


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

Fig. 13 Normalized Maximum Transient Thermal Impedance($z_{\Theta JC}$)

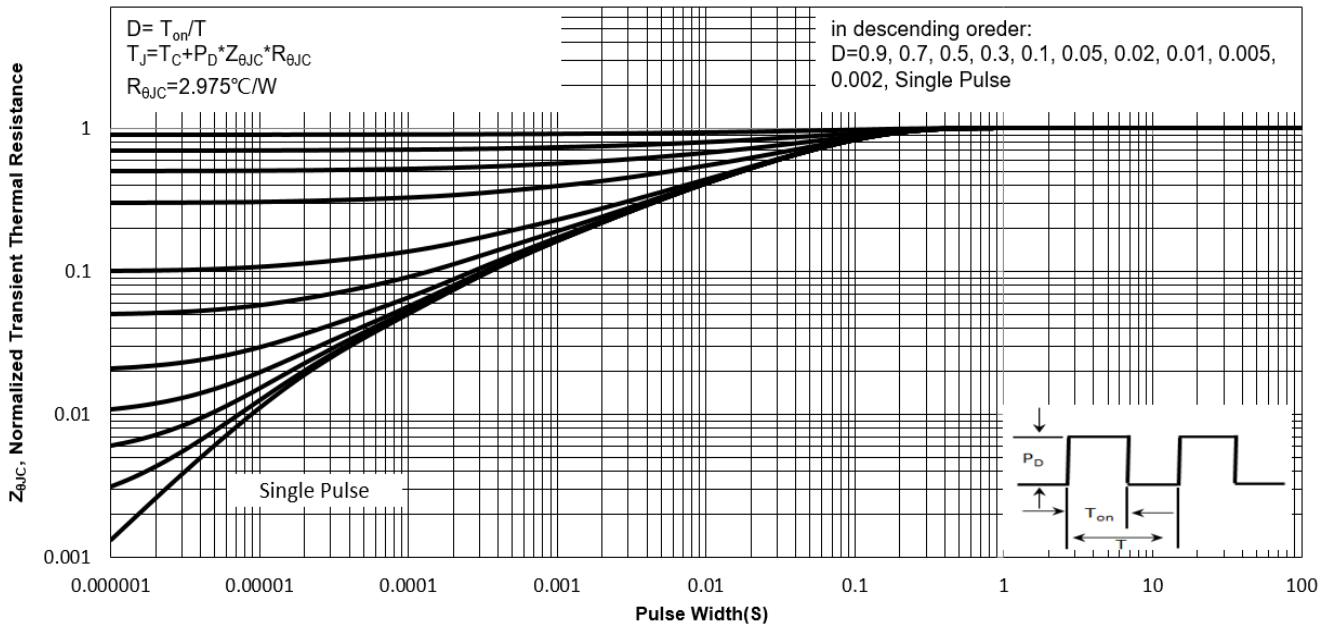
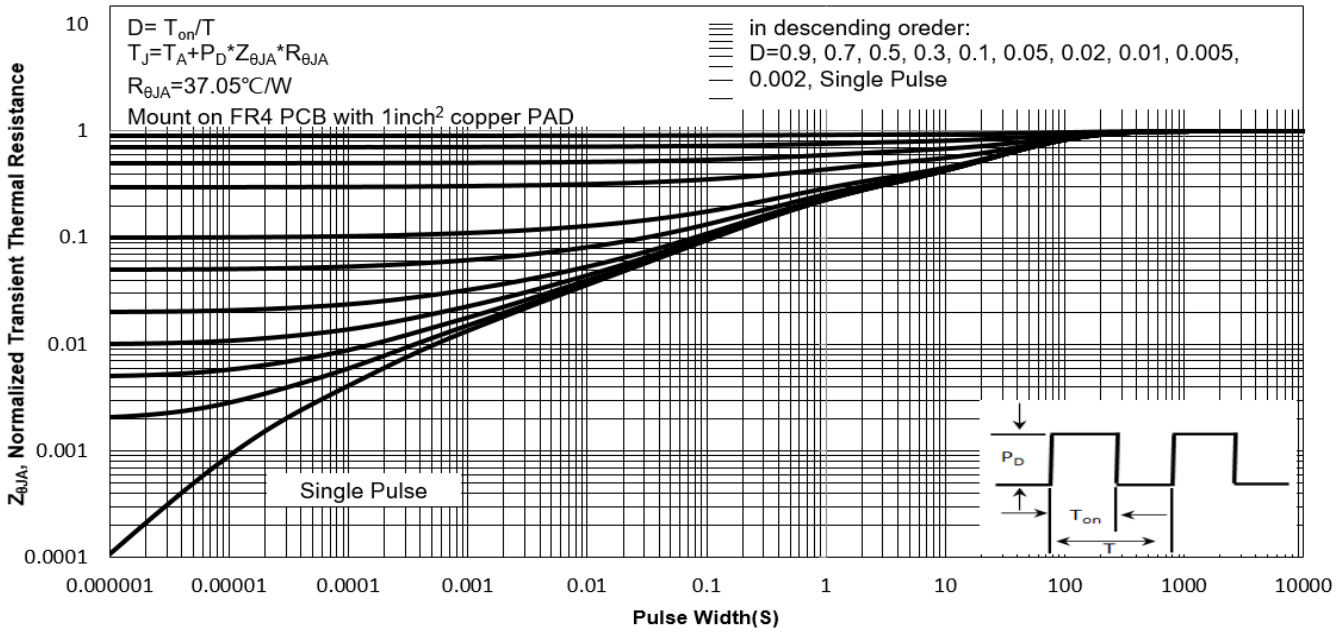


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\Theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

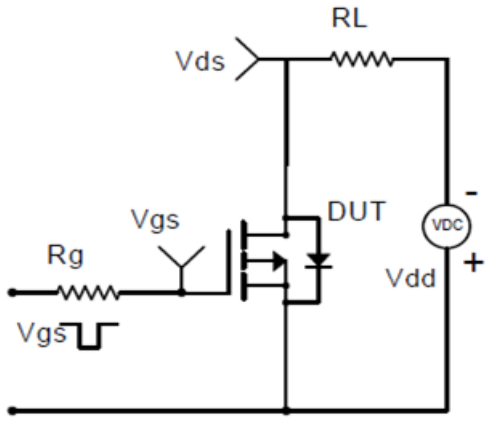


Fig.1-2 Switching Waveform

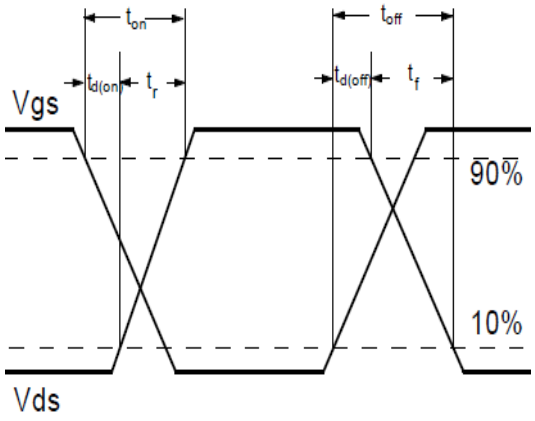


Fig.2-1 Gate charge test circuit

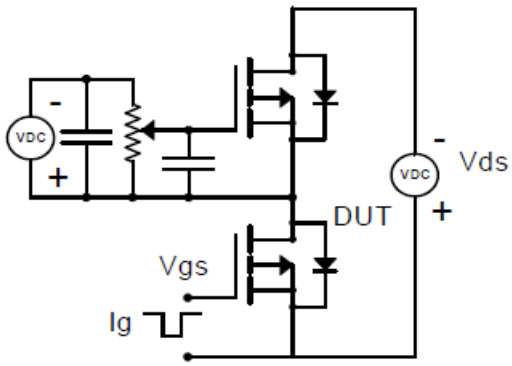


Fig.2-2 Gate charge waveform

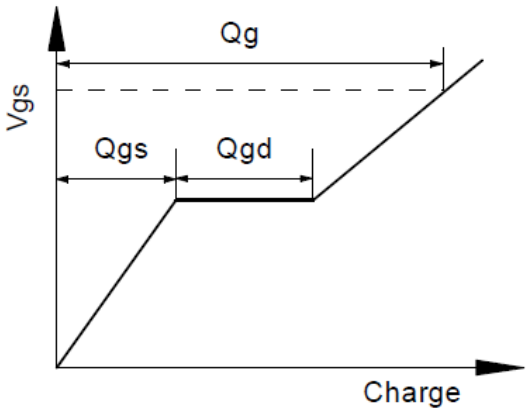


Fig.3-1 Avalanche test circuit

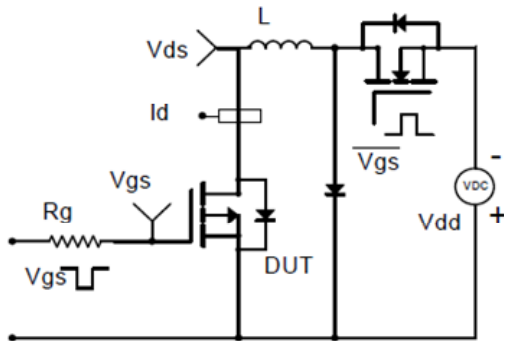
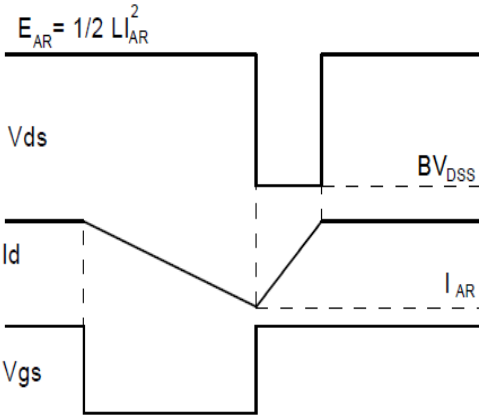
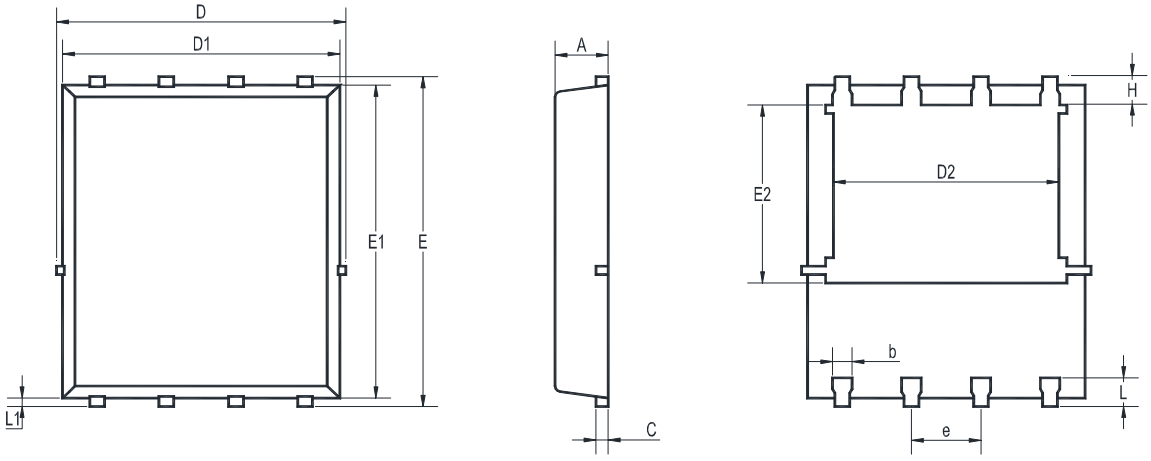


Fig.3-2 Avalanche waveform



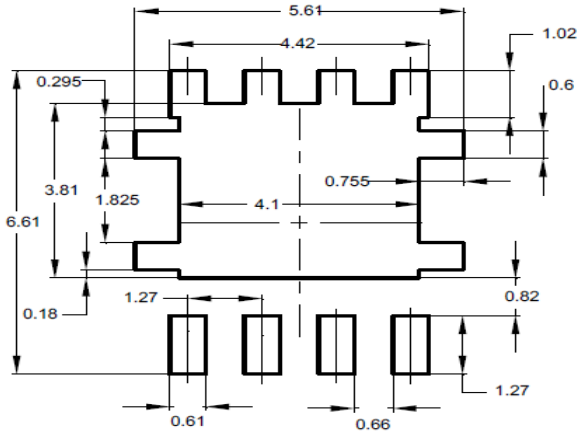
WTM504P150LS-AH

Package Outline Dimensions (Units: mm) DFN5060



UNIT	A	b	C	D	D1	D2	E	E1	E2	e	L	L1	H
mm	1.12 0.9	0.51 0.33	0.34 0.11	5.26 4.7	5.1 4.7	4. 5 3.56	6.25 5.75	6 5.6	3.66 3.18	1.37 1.17	0.71 0.35	0.2 0.06	0.71 0.35

Recommended Soldering Footprint

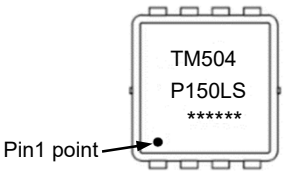


Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
DFN5060	12	8 ± 0.1	0.315 ± 0.004	330	13	5,000

Marking information

" TM504P150LS " = Part No.
" ****** " = Date Code Marking
Font type: Arial



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