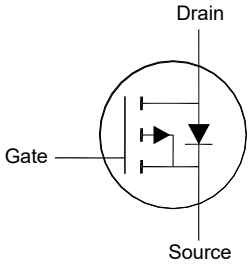
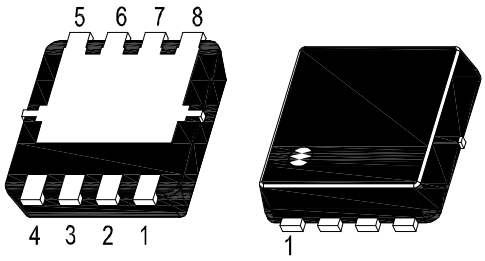
WTM302P130US-HAF

P-Channel Enhancement Mode MOSFET

Features

- Low On-Resistance
- Halogen and Antimony Free(HAF), RoHS compliant





1. Source 2. Source 3. Source 4. Gate
5. Drain 6. Drain 7. Drain 8. Drain
DFN3030 Plastic Package

Key Parameters

Parameter	Value	Unit
$-V_{(BR)DSS}$	20	V
$R_{DS(ON)}$ Max	13 @ $-V_{GS}$ = 10 V	mΩ
	16 @ $-V_{GS}$ = 4.5 V	
$-V_{GS(th)}$ typ	0.5	V
Q_g typ	68 @ $-V_{GS}$ = 10 V	nC

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current T_c = 25℃	$-I_D$	56	A
Drain Current T_c = 100℃		35	
Peak Drain Current [1]	$-I_{DM}$	180	A
Avalanche Current	$-I_{AS}$	30	A
Avalanche Energy [2]	E_{AS}	45	mJ
Power Dissipation T_c = 25℃	P_D	33.2	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	$R_{\theta JC}$	3.7	℃/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, $-I_{AS}$ = 30 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: 16/02/2023 Rev: 02

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	$-V_{(BR)DSS}$	20	-	-	V
Drain-Source On-State Current at $-V_{DS}$ = 20 V	$-I_{DSS}$	-	-	1	µA
Gate-Source Leakage Current at V_{GS} = ± 12 V	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at V_{DS} = V_{GS}, $-I_D$ = 250 µA	$-V_{GS(th)}$	0.4	-	1	V
Drain-Source On-State Resistance at $-V_{GS}$ = 10 V, $-I_D$ = 15 A at $-V_{GS}$ = 4.5 V, $-I_D$ = 12 A	$R_{DS(ON)}$	- -	10 -	13 16	mΩ
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS}$ = 5 V, $-I_D$ = 12 A	g_{fs}	-	37.5	-	S
Gate resistance at V_{GS} = 0 V, V_{DS} = 0 V, f = 1 MHz	R_g	-	4.4	-	Ω
Input Capacitance at V_{GS} = 0 V, $-V_{DS}$ = 10 V, f = 1 MHz	C_{iss}	-	2896	-	pF
Output Capacitance at V_{GS} = 0 V, $-V_{DS}$ = 10 V, f = 1 MHz	C_{oss}	-	451	-	pF
Reverse Transfer Capacitance at V_{GS} = 0 V, $-V_{DS}$ = 10 V, f = 1 MHz	C_{rss}	-	384	-	pF
Total Gate Charge at $-V_{GS}$ = 10 V, $-V_{DS}$ = 10 V, $-I_D$ = 15 A at $-V_{GS}$ = 4.5 V, $-V_{DS}$ = 10 V, $-I_D$ = 15 A	Q_g	- -	68 32	- -	nC
Gate-Source Charge at $-V_{GS}$ = 10 V, $-V_{DS}$ = 10 V, $-I_D$ = 15 A	Q_{gs}	-	5.5	-	nC
Gate-Drain Charge at $-V_{GS}$ = 10 V, $-V_{DS}$ = 10 V, $-I_D$ = 15 A	Q_{gd}	-	9	-	nC
Turn-On Delay Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 10 V, $-I_D$ = 15 A, R_G = 3.3 Ω	$t_{d(on)}$	-	16	-	ns
Turn-On Rise Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 10 V, $-I_D$ = 15 A, R_G = 3.3 Ω	t_r	-	67	-	ns
Turn-Off Delay Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 10 V, $-I_D$ = 15 A, R_G = 3.3 Ω	$t_{d(off)}$	-	45	-	ns
Turn-Off Fall Time at $-V_{GS}$ = 10 V, $-V_{DD}$ = 10 V, $-I_D$ = 15 A, R_G = 3.3 Ω	t_f	-	11	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S$ = 1 A, V_{GS} = 0 V	$-V_{SD}$	-	-	1.2	V
Body-Diode Continuous Current	$-I_S$	-	-	56	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	180	A
Body Diode Reverse Recovery Time at $-I_S$ = 15 A, di/dt = 100 A / µs	t_{rr}	-	30.7	-	ns
Body Diode Reverse Recovery Charge at $-I_S$ = 15 A, di/dt = 100 A / µs	Q_{rr}	-	8	-	nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

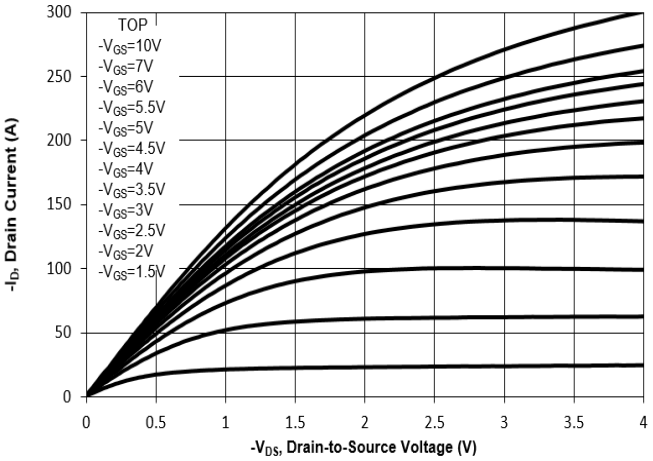


Fig. 2 Typical Transfer Characteristics

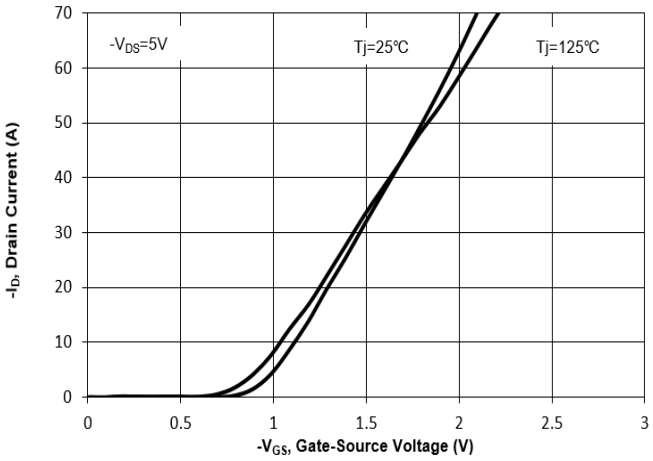


Fig. 3 on-Resistance vs. Drain Current

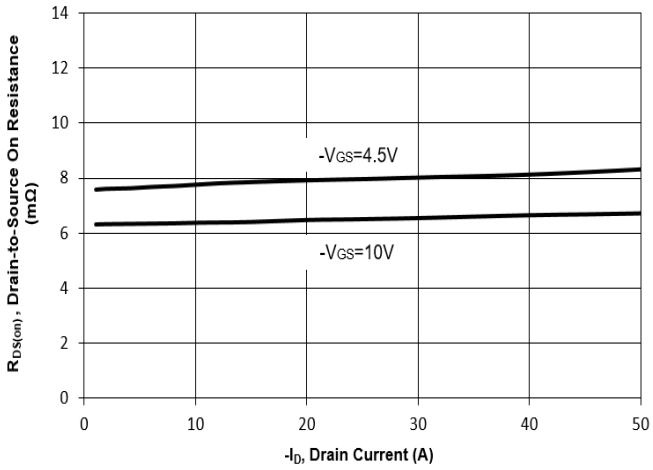


Fig. 4 on-Resistance vs. Gate to Source Voltage

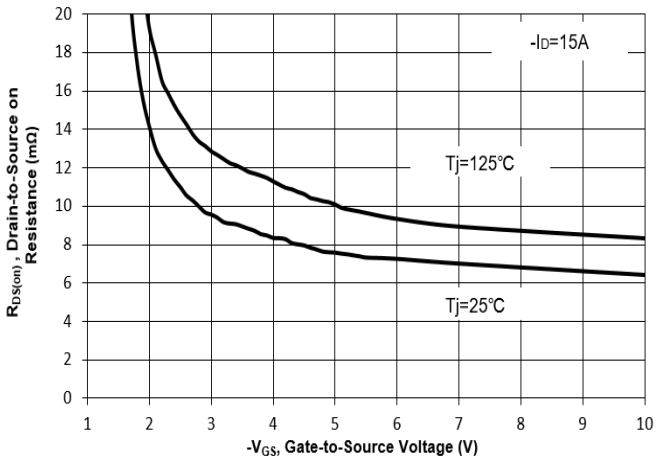


Fig. 5 on-Resistance vs.T_j

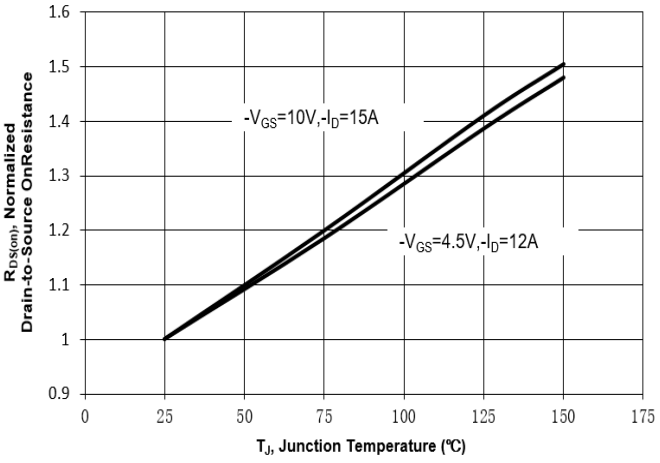
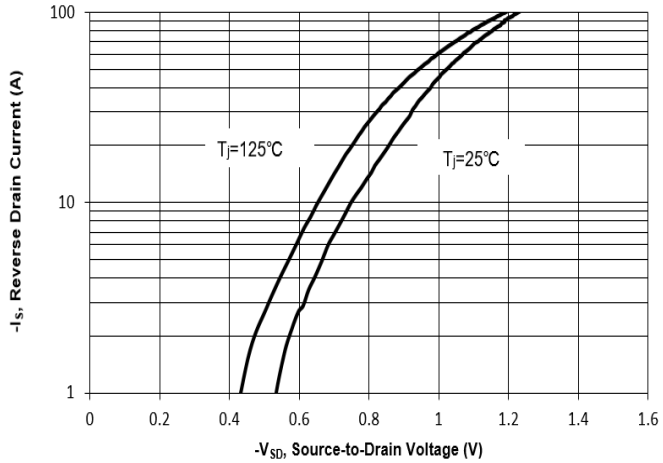


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

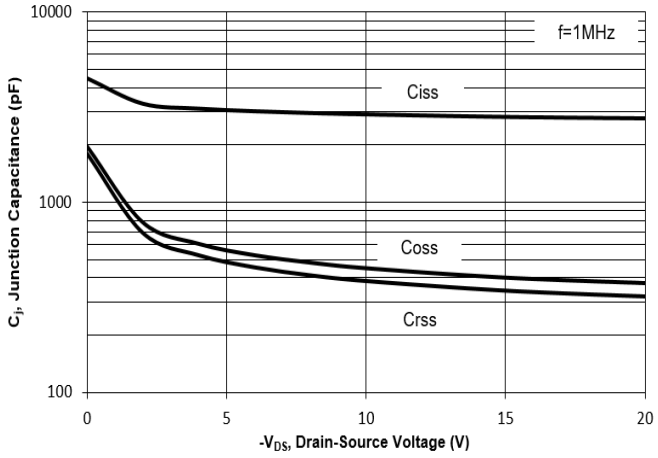


Fig. 8 Drain-Source Leakage Current vs. T_j

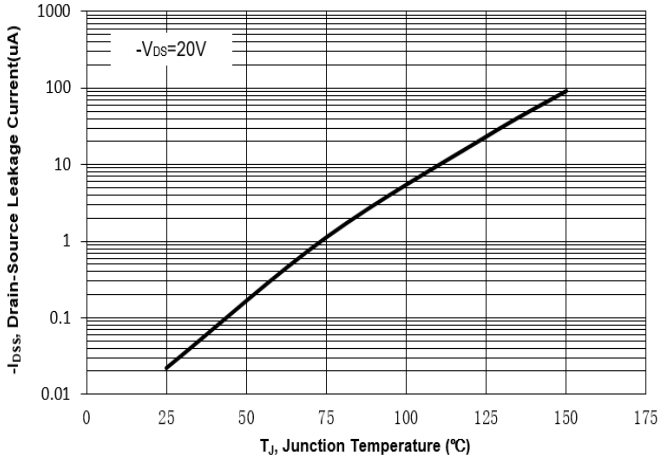


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

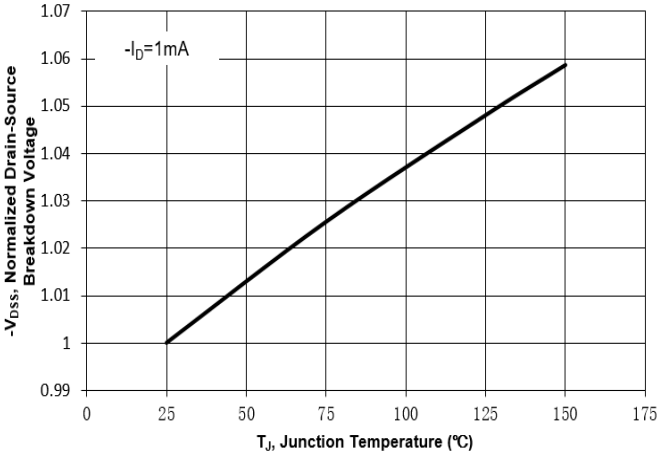


Fig. 10 Gate Threshold Variation vs. T_j

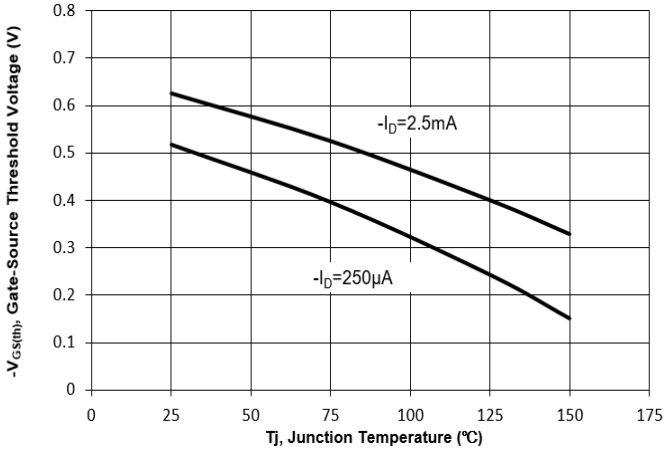


Fig. 11 Gate Charge

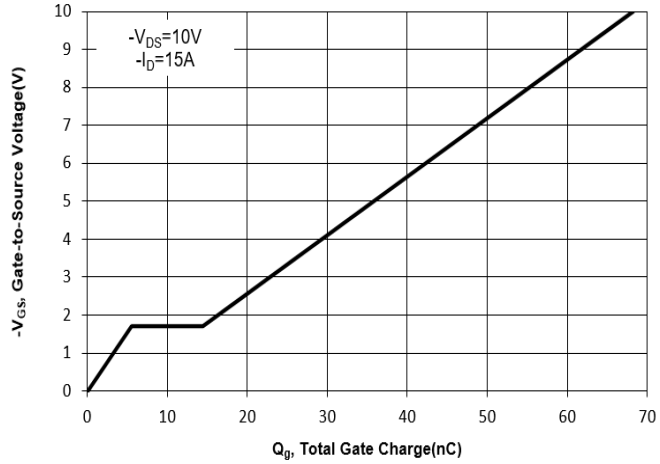
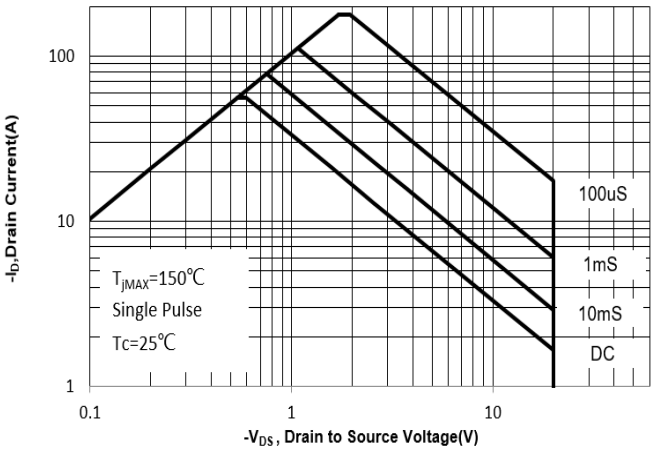


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

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

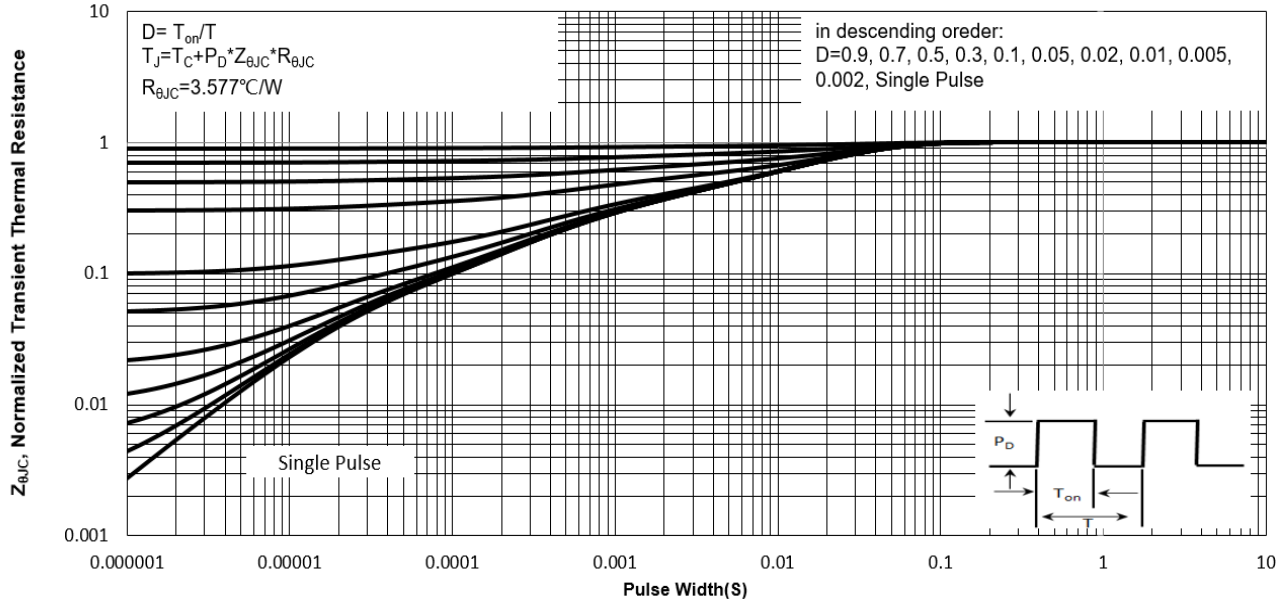
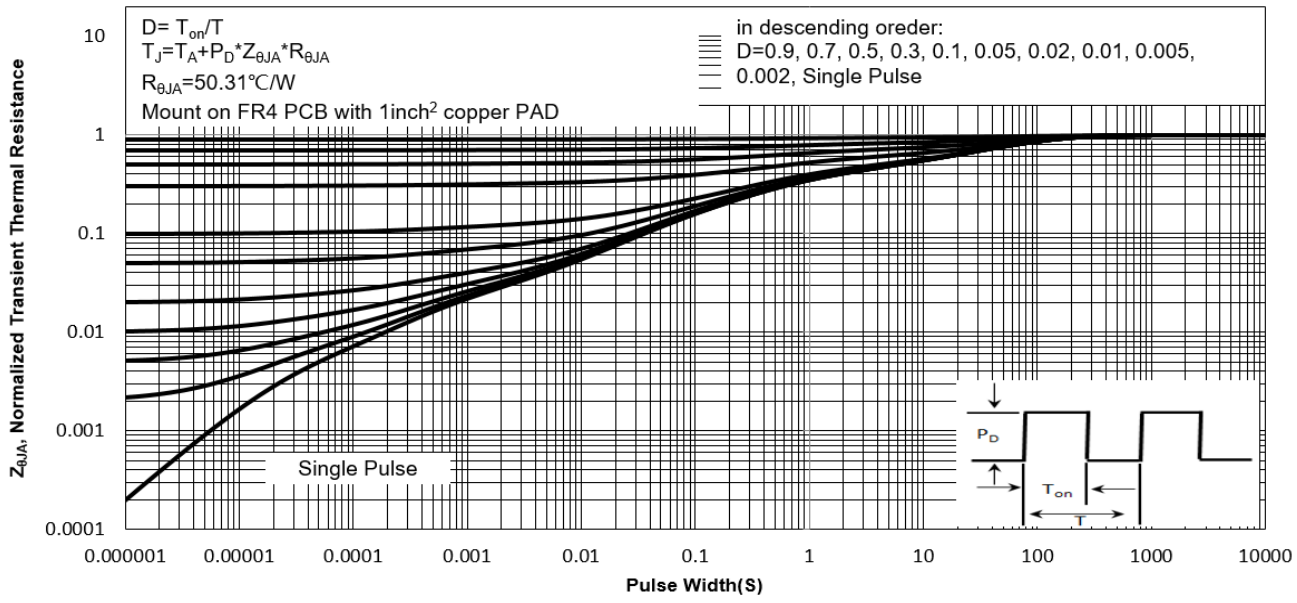


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\Theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

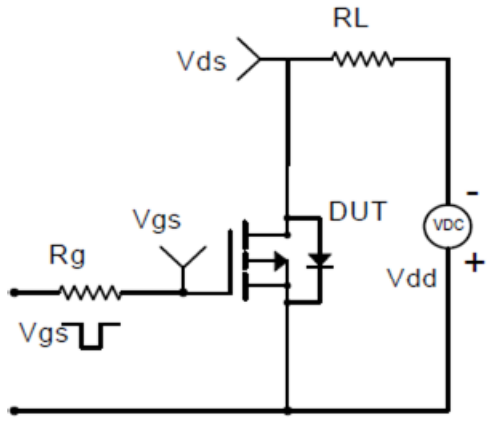


Fig.1-2 Switching Waveform

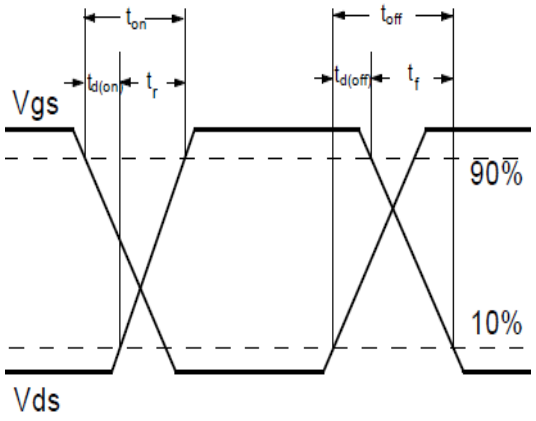


Fig.2-1 Gate charge test circuit

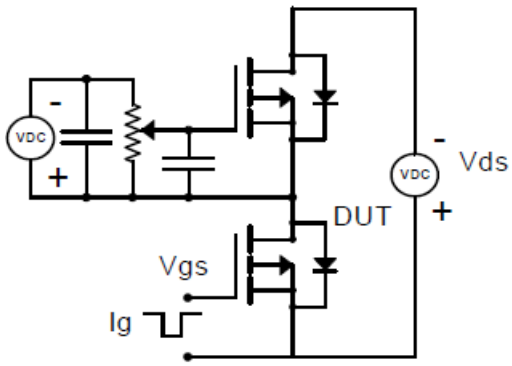


Fig.2-2 Gate charge waveform

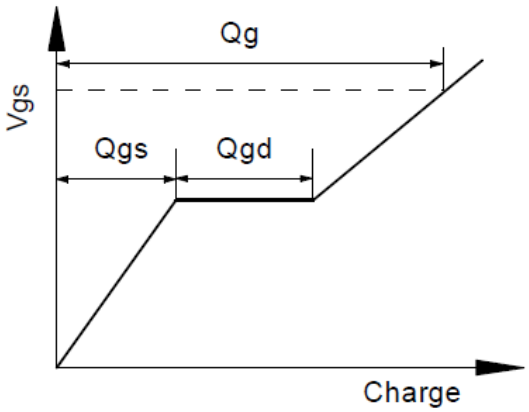


Fig.3-1 Avalanche test circuit

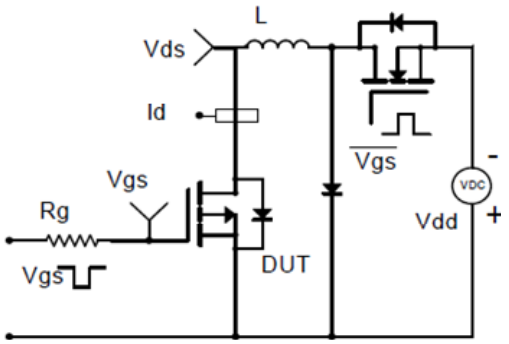
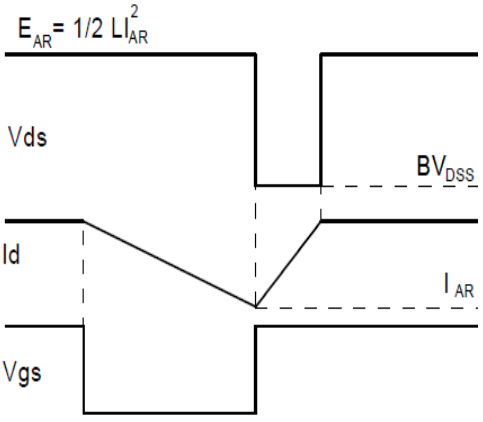
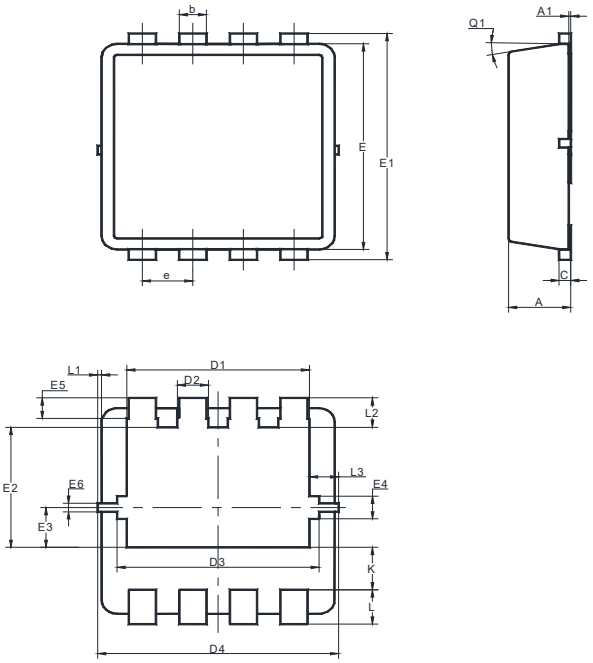


Fig.3-2 Avalanche waveform



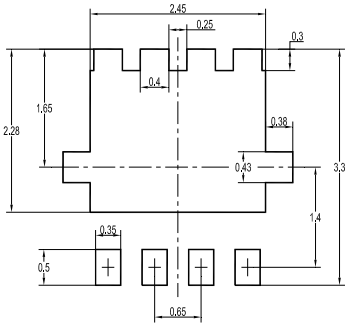
Package Outline Dimensions (Units: mm) DFN3030



UNIT	A	A1	b	c	D1	D2	D3	D4	E	E1	E2	E3	E4
mm	0.9	0.05	0.35	0.25	2.6	0.5	2.7	3.2	3.1	3.3	1.85	0.68	0.43
	0.7	0	0.24	0.1	2.4	0.3	2.5	3	2.9	3.1	1.65	0.48	0.23

UNIT	E5	E6	e	K	L	L1	L2	L3	θ1
mm	0.4	0.25	0.7	0.72	0.5	0.1	0.53	0.475	12°
	0.2	0.15	0.6	0.52	0.3	0	0.33	0.275	0°

Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
DFN3030	12	8 ± 0.1	0.315 ± 0.004	330	13	5,000

Marking information

" TM302P130US " = Part No.

" ****** " = Date Code Marking

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