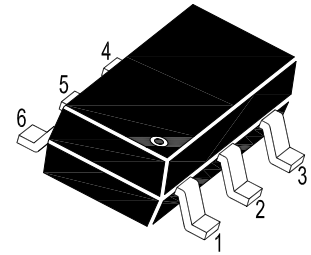
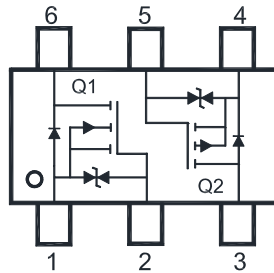


MMFTX3008KDW-CH

Complementary N/P-Channel Enhancement Mode MOSFET

Features

- AEC-Q101 Qualified
- Low threshold voltage
- Built-in G-S Protection Diode
- Halogen and Antimony Free(HAF), RoHS compliant
- Typical ESD Protection HBM Class 1C



Q1: 1.Source 2.Gate 6.Drain
Q2: 4.Source 5.Gate 3.Drain
SOT-363 Plastic Package

Classification	Voltage Range(V)
0A	< 125
0B	125 to < 250
1A	250 to < 500
1B	500 to < 1000
1C	1000 to < 2000
2	2000 to < 4000
3A	4000 to < 8000
3B	≥ 8000

Application

- Portable appliances
- Battery management

Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified) (Q1/Q2)

Parameter	Symbol	Value		Unit
		Q1	Q2	
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 8	± 8	V
Continuous Drain Current	I_D	350	-200	mA
Peak Drain Current, Pulsed ¹⁾	I_{DM}	1.4	-0.8	A
Total Power Dissipation	P_{tot}	280 ²⁾ 320 ³⁾		mW
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150		°C

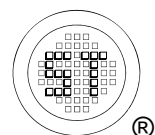
Thermal Characteristics (Q1/Q2)

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	446 ²⁾ 390 ³⁾	°C/W

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

²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad.

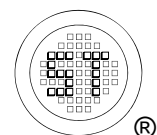
³⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.



MMFTX3008KDW-CH

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified (N-Channel Q1)

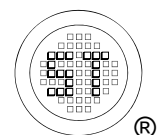
Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250 \mu\text{A}$	BV_{DSS}	30	-	-	V
Drain-Source Leakage Current at $V_{DS} = 30 \text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 8 \text{ V}$	I_{GSS}	-	-	± 1	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	$V_{GS(th)}$	0.5	-	1.1	V
Static Drain Source On-Resistance at $V_{GS} = 4.5 \text{ V}$, $I_D = 350 \text{ mA}$ at $V_{GS} = 2.5 \text{ V}$, $I_D = 200 \text{ mA}$ at $V_{GS} = 1.8 \text{ V}$, $I_D = 10 \text{ mA}$	$R_{DS(ON)}$	- - -	- - -	1.4 2.1 2.8	Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = 4.5 \text{ V}$, $I_D = 350 \text{ mA}$	g_{fs}	-	1.1	-	S
Input Capacitance at $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{iss}	-	54	-	pF
Output Capacitance at $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{oss}	-	9.4	-	pF
Reverse Transfer Capacitance at $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{rss}	-	4.4	-	pF
Gate charge total at $V_{DS} = 15 \text{ V}$, $I_D = 0.5 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ at $V_{DS} = 15 \text{ V}$, $I_D = 0.5 \text{ A}$, $V_{GS} = 2.5 \text{ V}$	Q_g	- -	0.8 0.42	- -	nC
Gate to Source Charge at $V_{DS} = 15 \text{ V}$, $I_D = 0.5 \text{ A}$, $V_{GS} = 4.5 \text{ V}$	Q_{gs}	-	0.2	-	nC
Gate to Drain Charge at $V_{DS} = 15 \text{ V}$, $I_D = 0.5 \text{ A}$, $V_{GS} = 4.5 \text{ V}$	Q_{gd}	-	0.08	-	nC
Turn-On Delay Time at $V_{DS} = 15 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 0.5 \text{ A}$, $R_G = 4.7 \Omega$	$t_{d(on)}$	-	1.8	-	ns
Turn-On Rise Time at $V_{DS} = 15 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 0.5 \text{ A}$, $R_G = 4.7 \Omega$	t_r	-	18	-	ns
Turn-Off Delay Time at $V_{DS} = 15 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 0.5 \text{ A}$, $R_G = 4.7 \Omega$	$t_{d(off)}$	-	29	-	ns
Turn-Off Fall Time at $V_{DS} = 15 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 0.5 \text{ A}$, $R_G = 4.7 \Omega$	t_f	-	22	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 350 \text{ mA}$	V_{SD}	-	-	1.2	V
Body-Diode Continuous Current	I_S	-	-	350	mA



MMFTX3008KDW-CH

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified (P-Channel Q2)

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $-I_D = 250 \mu\text{A}$	$-BV_{DSS}$	30	-	-	V
Drain-Source Leakage Current at $-V_{DS} = 30 \text{ V}$	$-I_{DSS}$	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 8 \text{ V}$	I_{GSS}	-	-	± 1	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250 \mu\text{A}$	$-V_{GS(th)}$	0.5	-	1.1	V
Drain-Source On-State Resistance at $-V_{GS} = 4.5 \text{ V}$, $-I_D = 200 \text{ mA}$ at $-V_{GS} = 2.5 \text{ V}$, $-I_D = 10 \text{ mA}$	$R_{DS(on)}$	- -	- -	4.1 6.5	Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS} = 4.5 \text{ V}$, $-I_D = 200 \text{ mA}$	g_{fs}	-	510	-	mS
Input Capacitance at $-V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{iss}	-	50	-	pF
Output Capacitance at $-V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{oss}	-	6	-	pF
Reverse Transfer Capacitance at $-V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{rss}	-	5	-	pF
Total Gate Charge at $-V_{DS} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$ at $-V_{DS} = 10 \text{ V}$, $-V_{GS} = 2.5 \text{ V}$, $-I_D = 0.1 \text{ A}$	Q_g	- -	1.22 0.8	- -	nC
Gate to Source Charge at $-V_{DS} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$	Q_{gs}	-	0.33	-	nC
Gate to Drain Charge at $-V_{DS} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$	Q_{gd}	-	0.22	-	nC
Turn-On Delay Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$, $R_G = 4.7 \Omega$	$t_{d(on)}$	-	3.4	-	ns
Turn-On Rise Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$, $R_G = 4.7 \Omega$	t_r	-	13	-	ns
Turn-Off Delay Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$, $R_G = 4.7 \Omega$	$t_{d(off)}$	-	37	-	ns
Turn-Off Fall Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 4.5 \text{ V}$, $-I_D = 0.1 \text{ A}$, $R_G = 4.7 \Omega$	t_f	-	23	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 200 \text{ mA}$	$-V_{SD}$	-	-	1.2	V
Body-Diode Continuous Current	$-I_S$	-	-	200	mA



MMFTX3008KDW-CH

Electrical characteristics curves (N-Channel Q1)

Fig. 1 Typical Output Characteristics

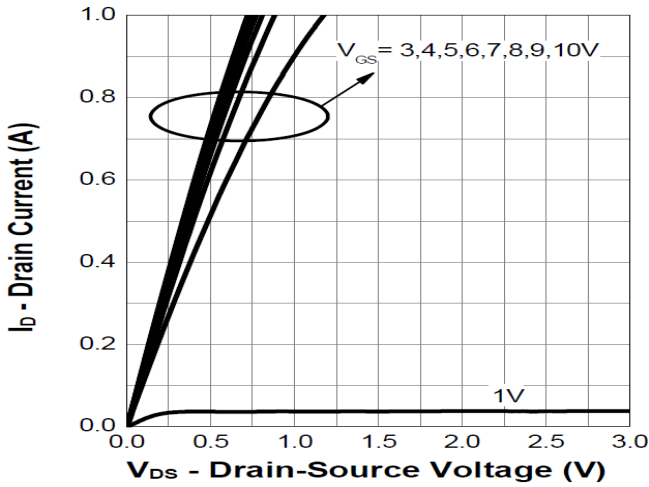


Fig. 2 Gate Threshold Variation vs. T_j

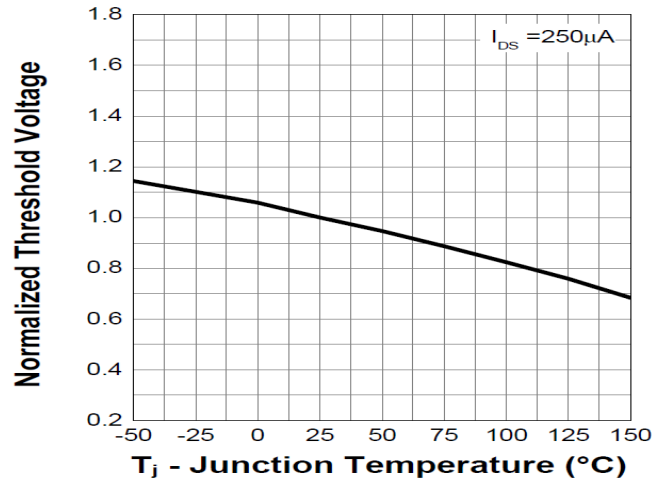


Fig. 3 on-Resistance vs. Drain Current

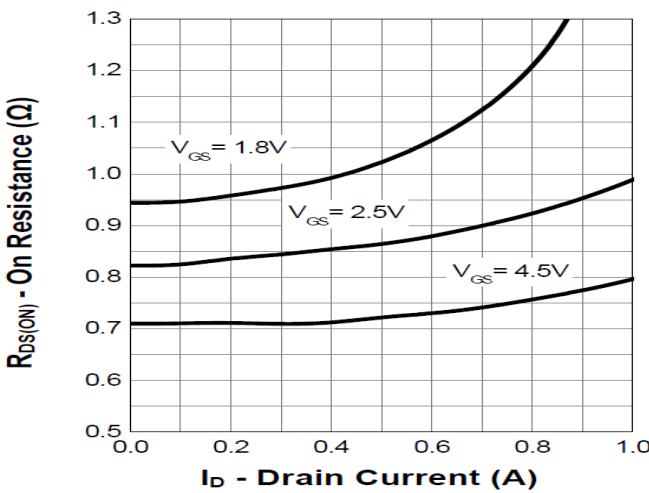


Fig. 4 on-Resistance vs. Gate-Source Voltage

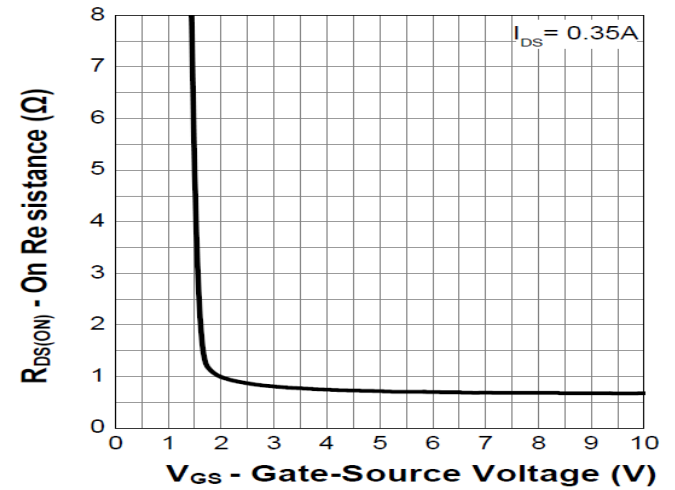


Fig. 5 on-Resistance vs. T_j

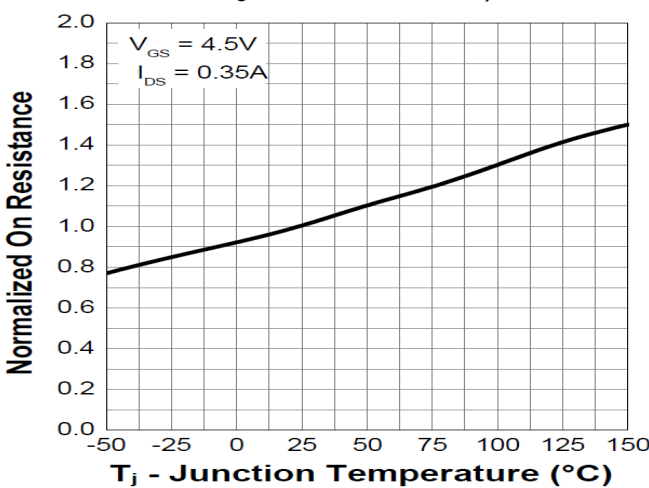
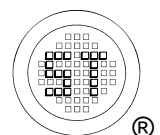
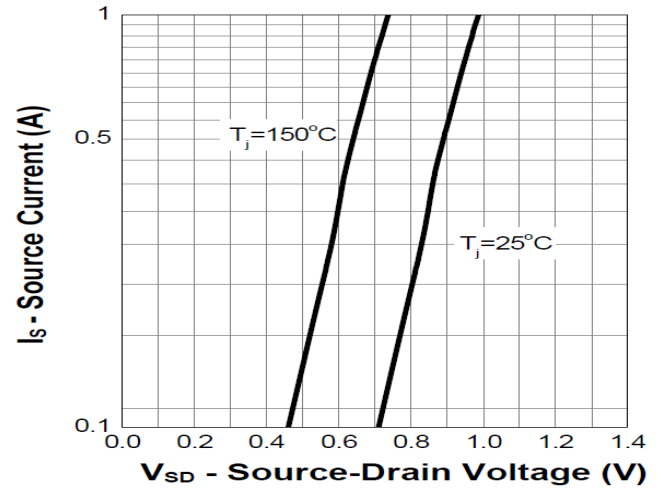


Fig. 6 Typical Forward Characteristics



MMFTX3008KDW-CH

Electrical characteristics curves (N-Channel Q1)

Fig. 7 Typical Junction Capacitance

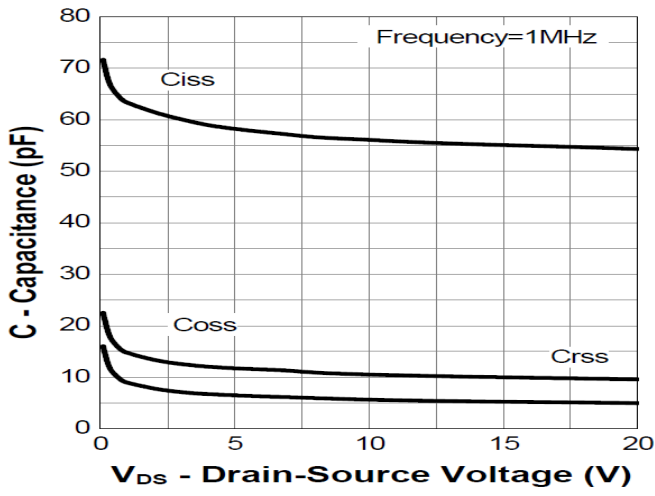
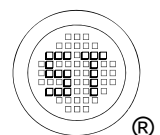
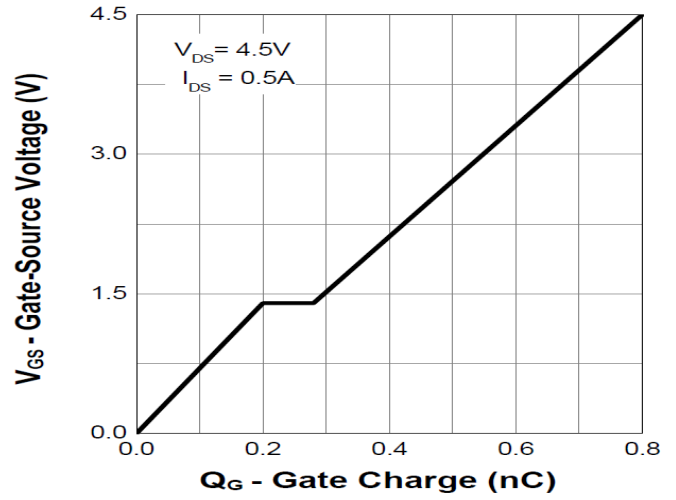


Fig. 8 Gate Charge



Electrical characteristics curves (P-Channel Q2)

Fig. 1 Typical Output Characteristics

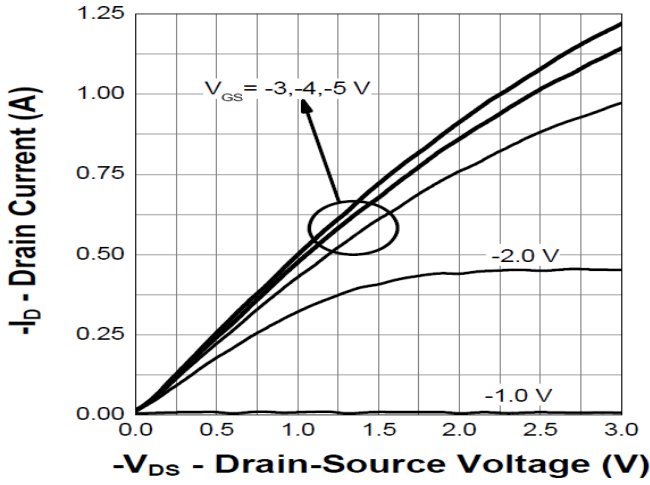


Fig. 2 Gate Threshold Variation vs. T_j

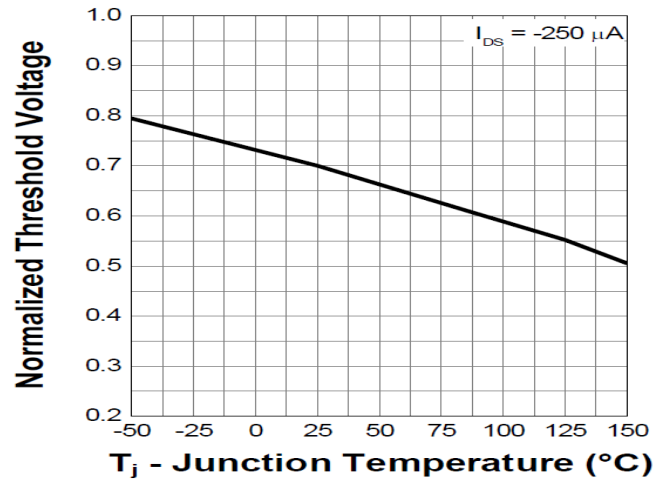


Fig. 3 on-Resistance vs. Drain Current

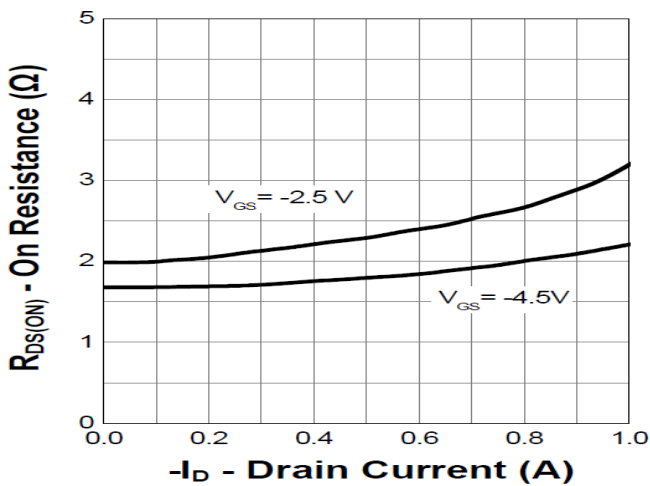


Fig. 4 on-Resistance vs. Gate-Source Voltage

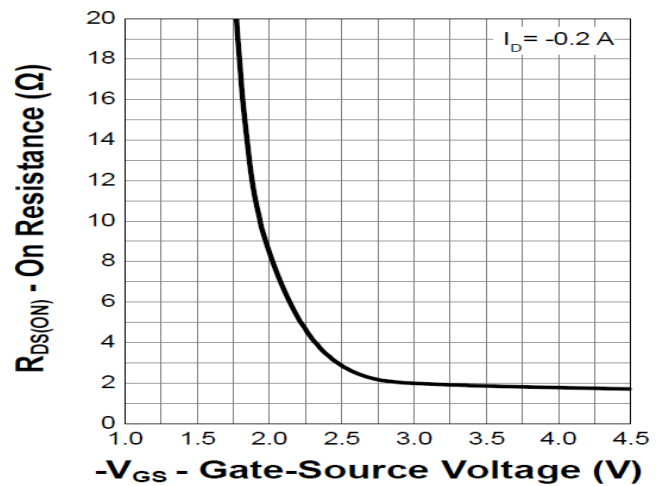


Fig. 5 on-Resistance vs. T_j

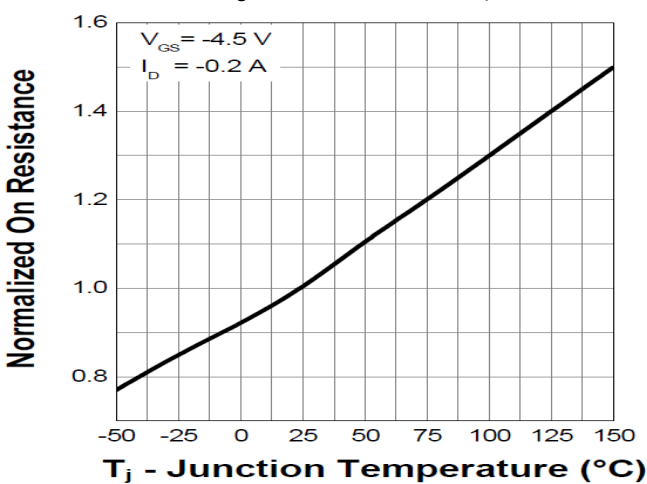
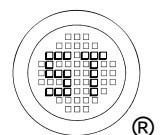
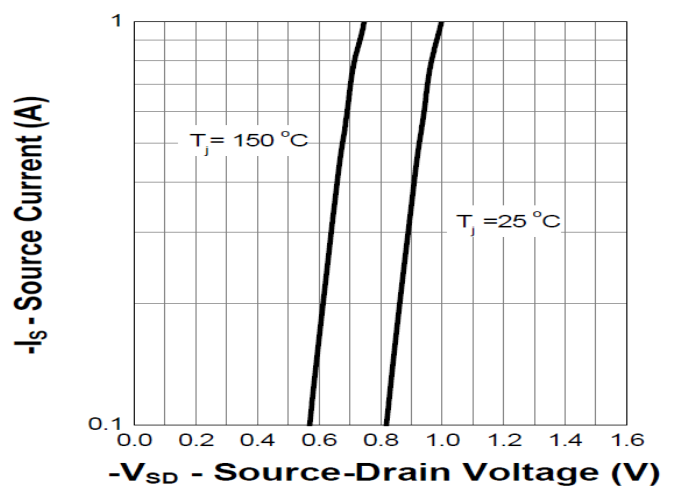


Fig. 6 Typical Forward Characteristics



MMFTX3008KDW-CH

Electrical characteristics curves (P-Channel Q2)

Fig. 7 Typical Junction Capacitance

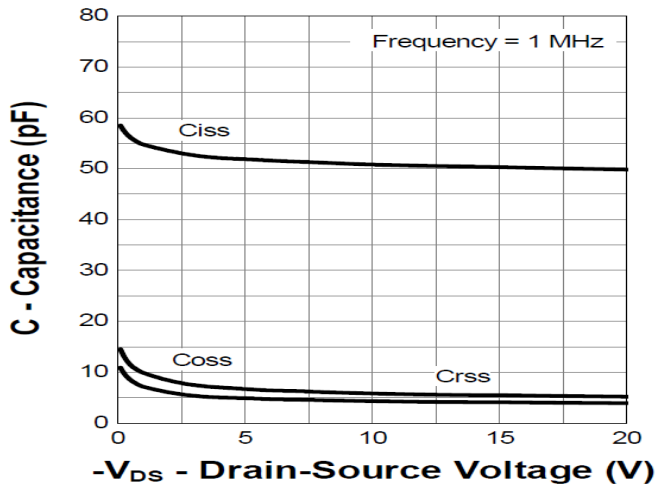
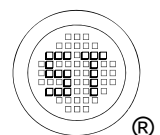
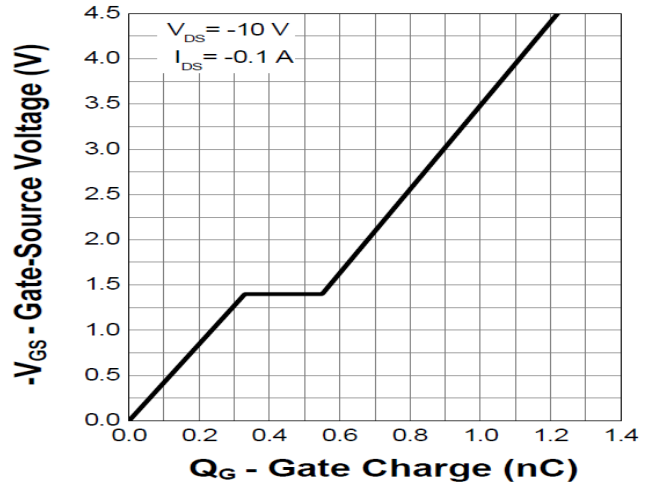


Fig. 8 Gate Charge



Test Circuits (N-Channel Q1)

Fig.1-1 Switching times test circuit

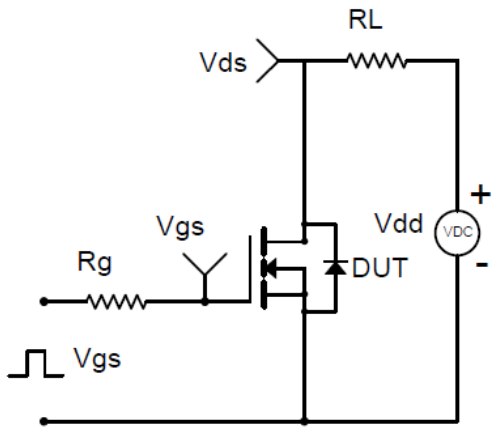


Fig.1-2 Switching Waveform

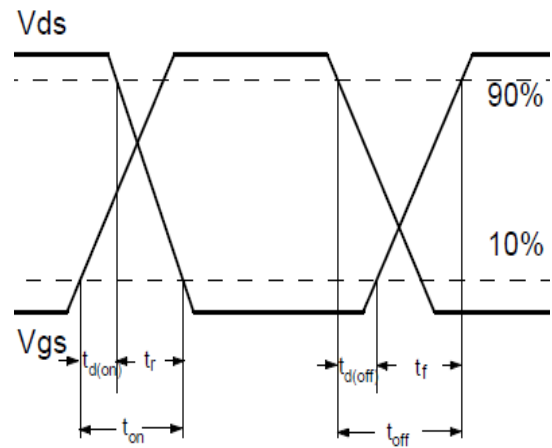


Fig.2-1 Gate charge test circuit

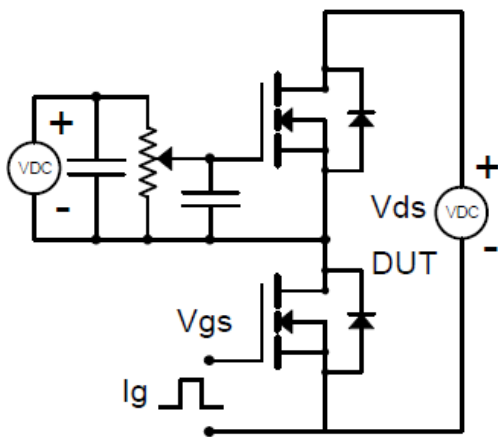
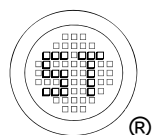
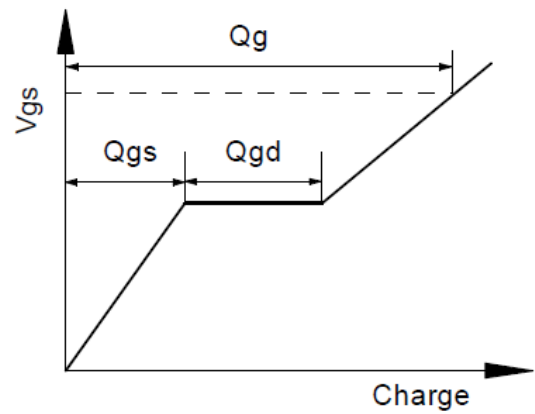


Fig.2-2 Gate charge waveform



Test Circuits (P-Channel Q2)

Fig.1-1 Switching times test circuit

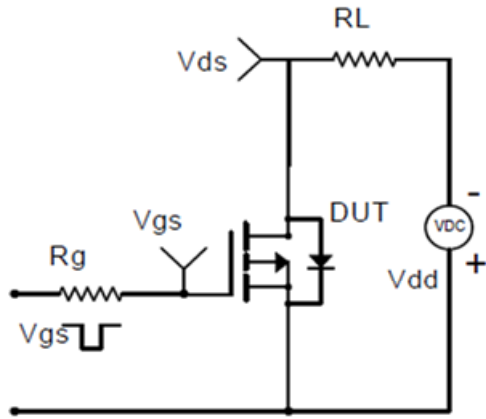


Fig.1-2 Switching Waveform

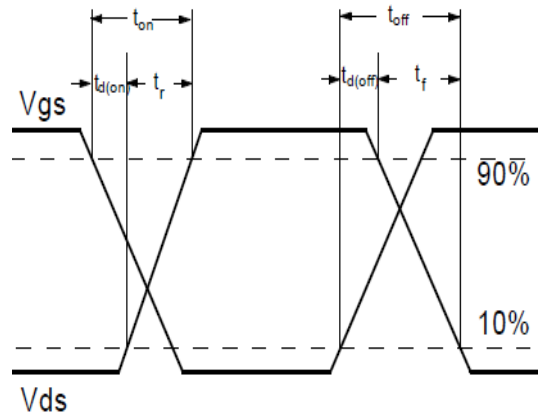


Fig.2-1 Gate charge test circuit

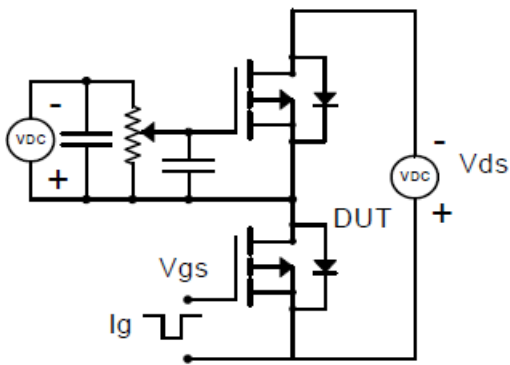
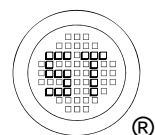
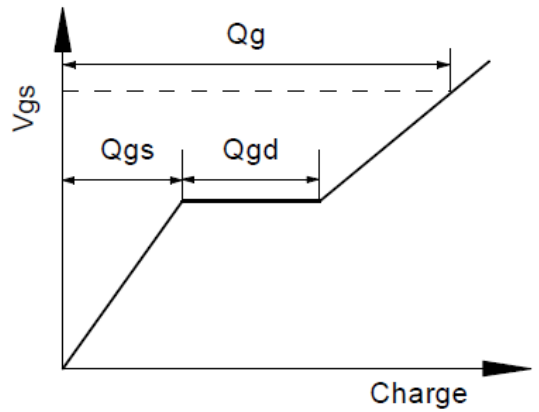


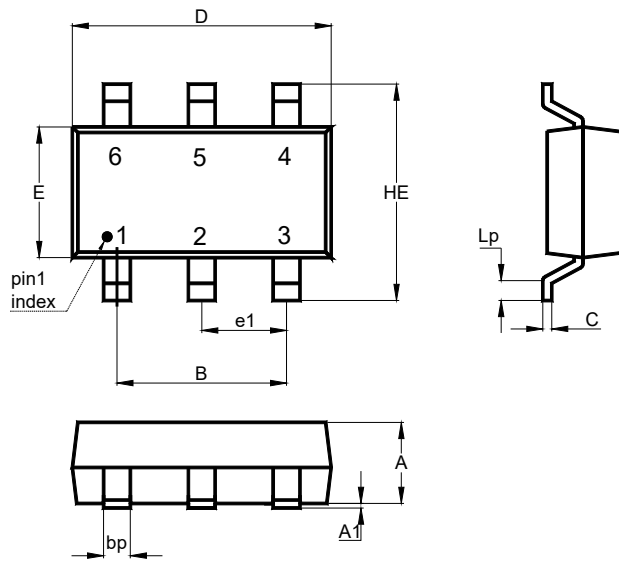
Fig.2-2 Gate charge waveform



MMFTX3008KDW-CH

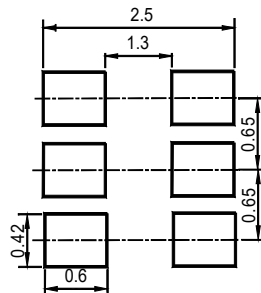
Package Outline (Dimensions in mm)

SOT-363



Unit	A	A1	B	C	D	E	e1	HE	Lp	bp
mm	1.0	0.1	1.3	0.25	2.2	1.35	0.65	2.2	0.4	0.3
	0.9	0	typ.	0.1	1.8	1.15	typ.	2.0	0.15	0.1

Recommended Soldering Footprint



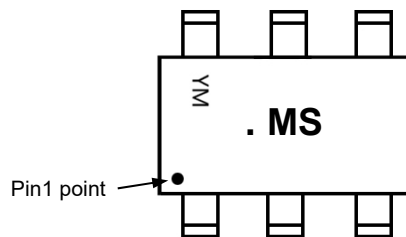
Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-363	8	4 ± 0.1	0.157 ± 0.004	178	7	3,000

Marking information

- " MS " = Part No.
- " • " = HAF (Halogen and Antimony Free)
- " YM " = Date Code Marking
- " Y " = Year
- " M " = Month

Font type: Arial



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