

MU02N028US

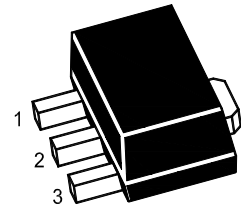
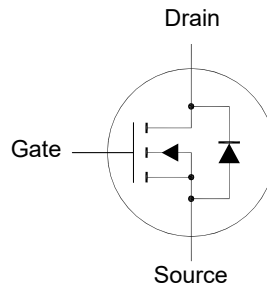
N-Channel Enhancement Mode MOSFET

Features

- Extremely low threshold voltage

Applications

- Portable appliances
- Battery management



1.Gate 2.Drain 3.Source
SOT-89 Plastic Package

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

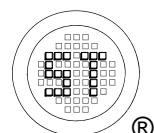
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	20	V
Drain-Gate Voltage	V_{GS}	± 12	V
Drain Current	I_D	5	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	20	A
Total Power Dissipation ²⁾	P_{tot}	1.5	W
Operating Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient ²⁾	$R_{\theta JA}$	83.3	$^\circ\text{C/W}$

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

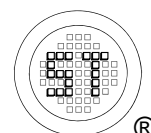
²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate, $t \leq 10 \text{ s}$.



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Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250 \mu\text{A}$	$V_{(BR)DSS}$	20	-	-	V
Zero Gate Voltage Drain Current at $V_{DS} = 16 \text{ V}$	I_{DSS}	-	-	1	μA
Gate-Source Leakage at $V_{GS} = \pm 12 \text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	$V_{GS(th)}$	0.4	-	1.0	V
Drain-Source On-State Resistance at $V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}$ at $V_{GS} = 2.5 \text{ V}, I_D = 4 \text{ A}$	$R_{DS(on)}$	- -	25 -	28 31	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = 5 \text{ V}, I_D = 4 \text{ A}$	g_{fs}	-	10	-	S
Gate Resistance at $V_{GS} = 0 \text{ V}, V_{DS} = 0 \text{ V}, f = 1 \text{ MHz}$	R_g	-	0.45	-	Ω
Input Capacitance at $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	C_{iss}	-	564	-	pF
Output Capacitance at $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	C_{oss}	-	84	-	pF
Reverse Transfer Capacitance at $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	C_{rss}	-	63	-	pF
Gate Charge Total at $V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}$ at $V_{DS} = 10 \text{ V}, V_{GS} = 2.5 \text{ V}, I_D = 5 \text{ A}$	Q_g	- -	8.8 5	- -	nC
Gate-Source Charge at $V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}$	Q_{gs}	-	1.6	-	nC
Gate-Drain Charge at $V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}$	Q_{gd}	-	2.7	-	nC
Turn-On Delay Time at $V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}, R_g = 3.3 \Omega$	$t_{d(on)}$	-	11	-	ns
Turn-On Rise Time at $V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}, R_g = 3.3 \Omega$	t_r	-	29	-	ns
Turn-Off Delay Time at $V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}, R_g = 3.3 \Omega$	$t_{d(off)}$	-	12	-	ns
Turn-Off Fall Time at $V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5 \text{ A}, R_g = 3.3 \Omega$	t_f	-	2	-	ns
BODY DIODE PARAMETERS					
Drain-Source Diode Forward Voltage at $V_{GS} = 0 \text{ V}, I_S = 1 \text{ A}$	V_{SD}	-	-	1.2	V
Body-Diode Continuous Current	I_S	-	-	5	A
Body Diode Reverse Recovery Time at $I_S = 5 \text{ A}, di/dt = 100 \text{ A} / \mu\text{s}$	t_{rr}	-	10.5	-	ns
Body Diode Reverse Recovery Charge at $I_S = 5 \text{ A}, di/dt = 100 \text{ A} / \mu\text{s}$	Q_{rr}	-	3.5	-	nC



Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

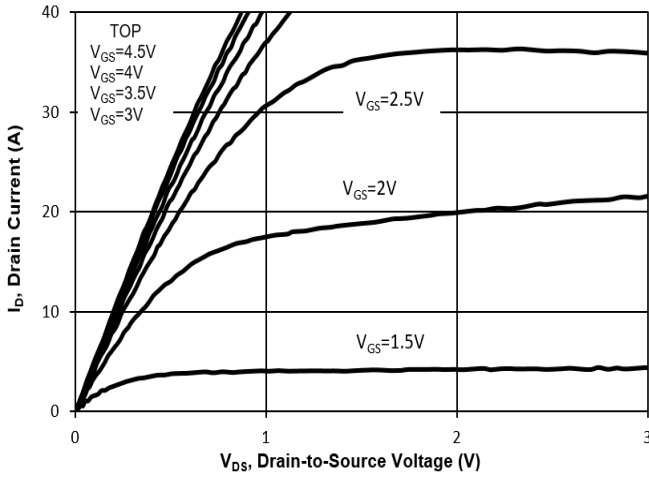


Fig. 2 Typical Transfer Characteristics

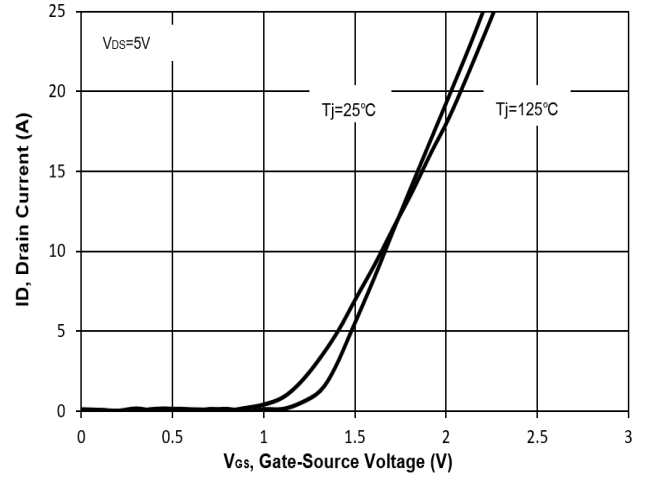


Fig. 3 on-Resistance vs. Drain Current

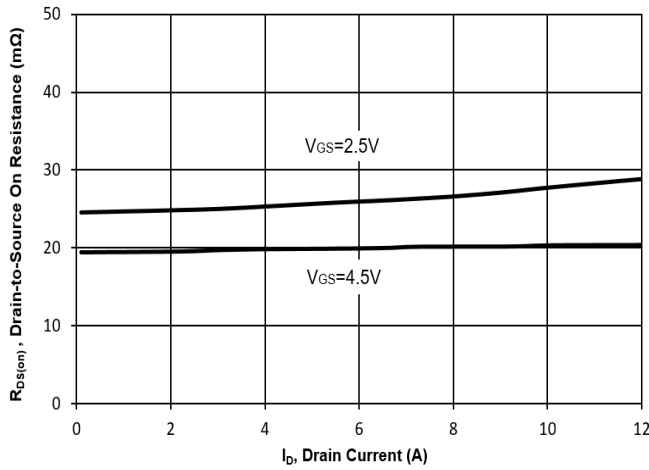


Fig. 4 on-Resistance vs. Gate-Source Voltage

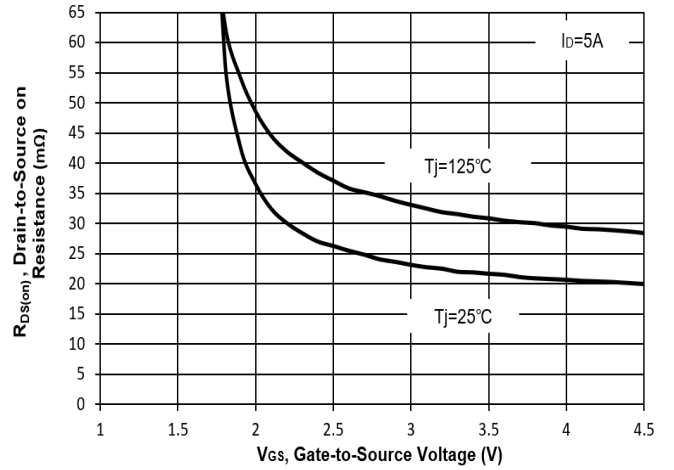


Fig. 5 on-Resistance vs. T_J

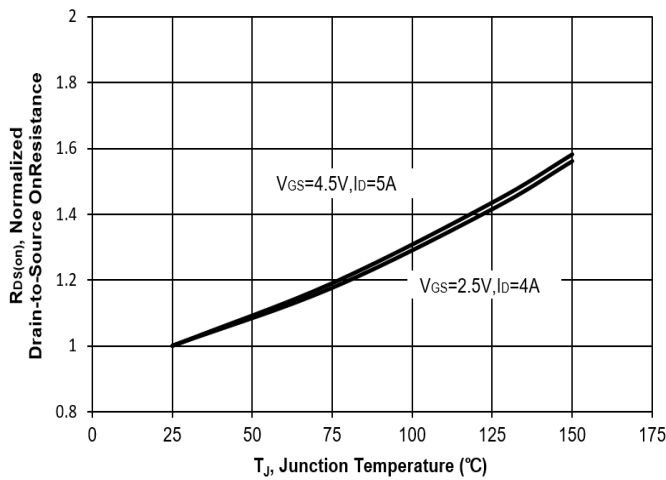
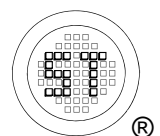
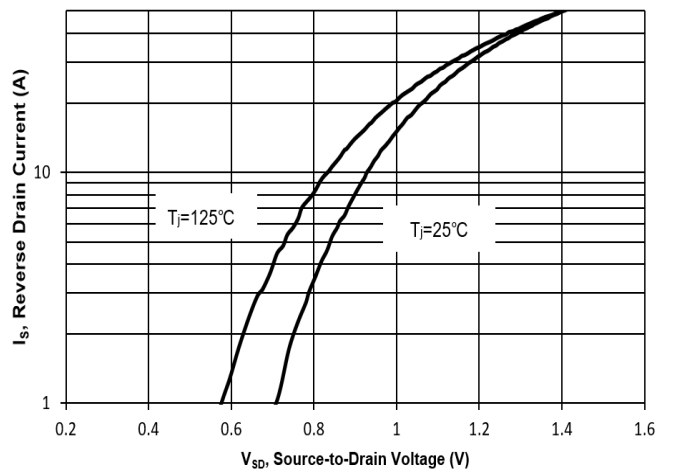


Fig. 6 Typical Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

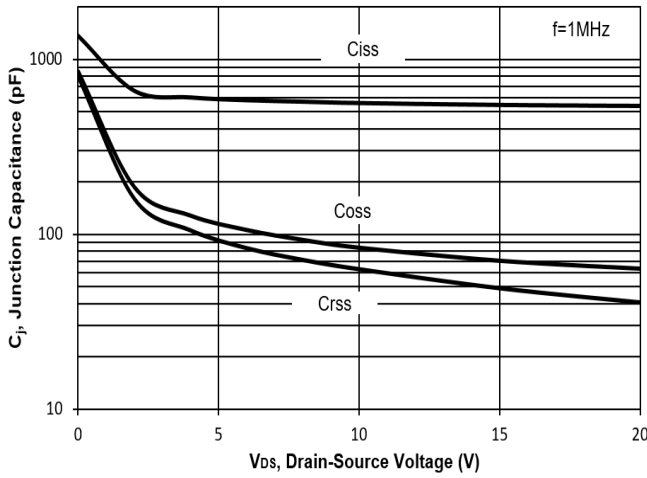


Fig. 8 Drain-Source Leakage Current vs. T_j

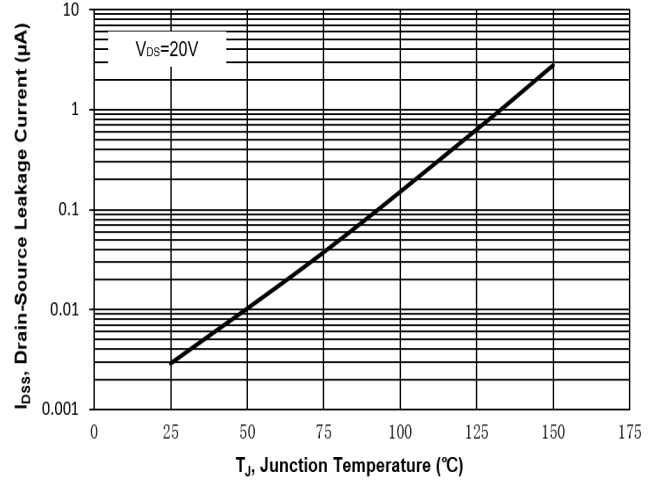


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

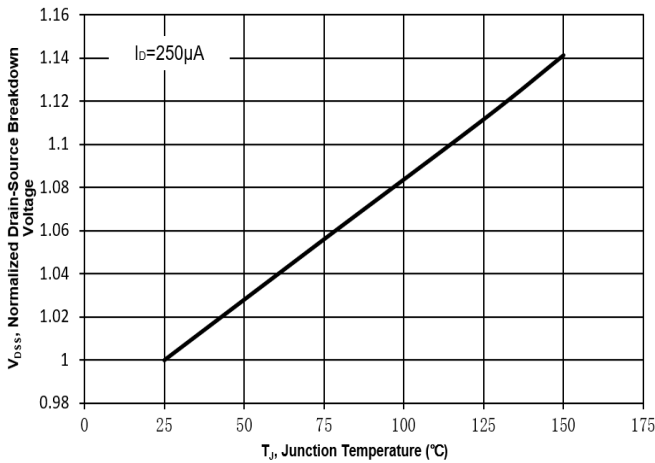


Fig. 10 Gate Threshold Variation vs. T_j

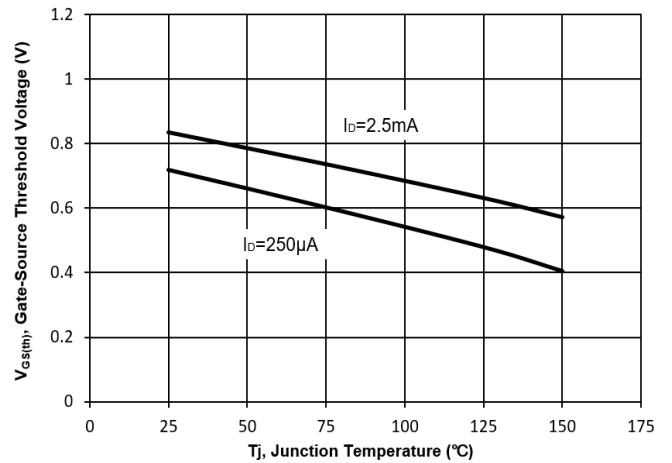
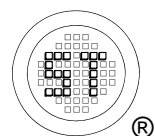
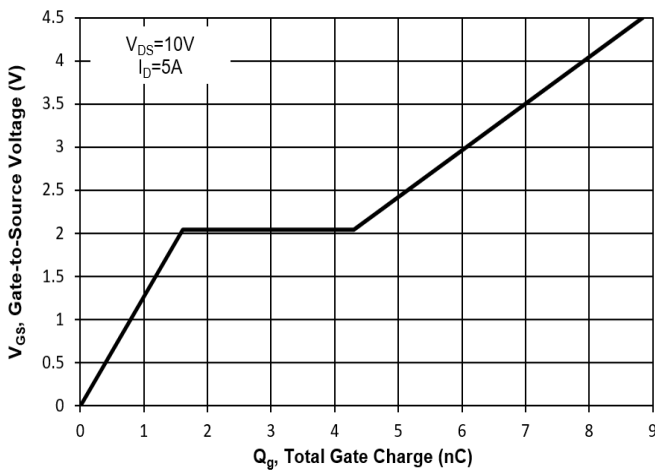


Fig. 11 Gate Charge



Test Circuits

Fig.1-1 Switching times test circuit

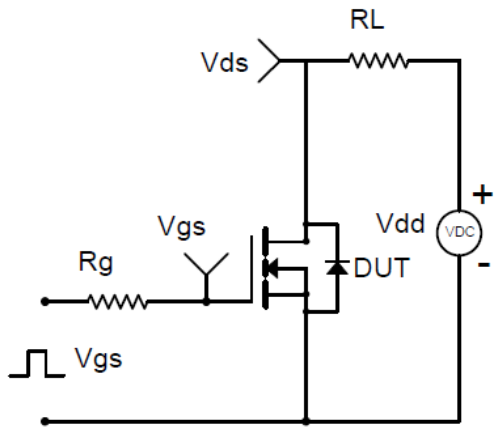


Fig.1-2 Switching Waveform

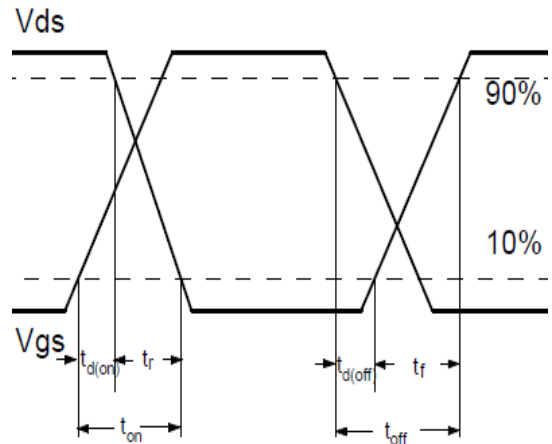


Fig.2-1 Gate charge test circuit

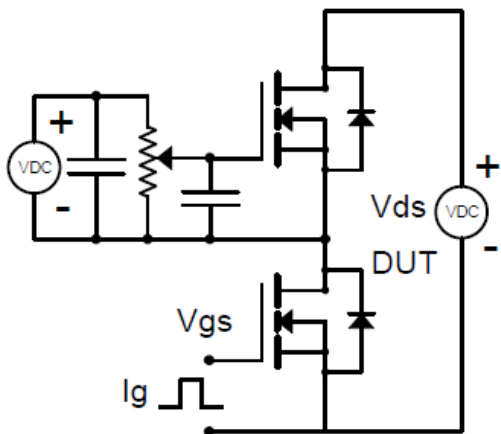
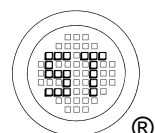
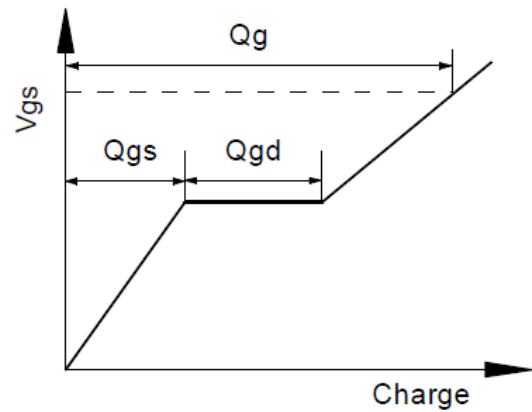


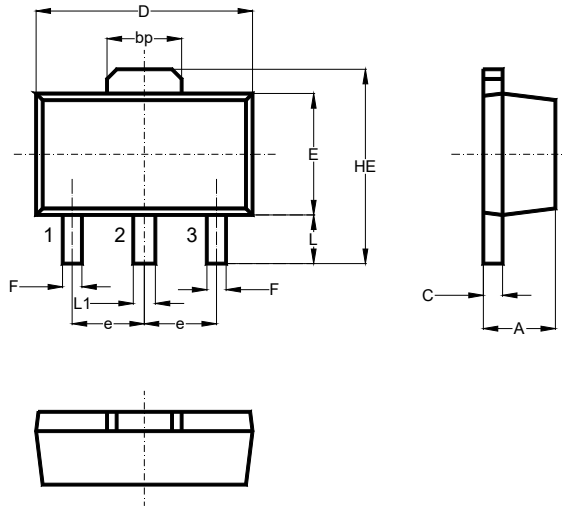
Fig.2-2 Gate charge waveform



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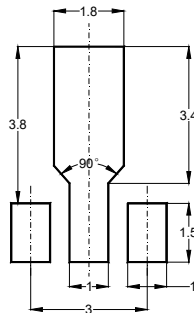
Package Outline (Dimensions in mm)

SOT-89



Unit	A	bp	C	D	E	F	HE	e	L	L1
mm	1.6	1.60	0.5	4.6	2.6	0.45	4.25	1.5	1.05	0.51
	1.4	1.50	0.3	4.4	2.4	0.35	3.75	typ.	0.95	0.41

Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-89	12	8 ± 0.1	0.315 ± 0.004	178	7	1,000
				330	13	4,000

Marking information

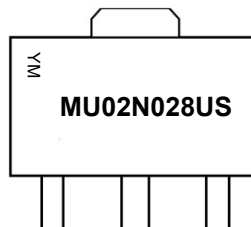
" MU02N028US " = Part No.

" YM " = Date Code Marking

" Y " = Year

" M " = Month

Font type: Arial



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