

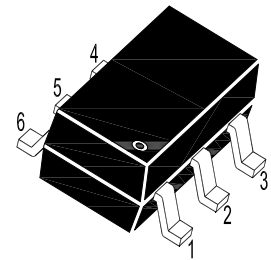
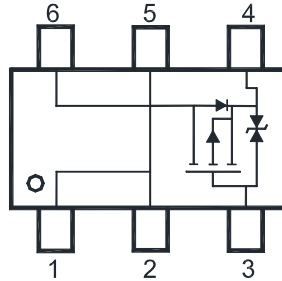
MD02P035USK4

P-Channel Enhancement Mode MOSFET

Features

- Surface-mounted package
- Fast Switching Speed
- Built-in G-S Protection Diode
- Typical ESD Protection HBM Class 3A

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



1. Drain 2. Drain 3. Gate
4. Source 5. Drain 6. Drain
SOT-26 Plastic Package

Applications

- Portable appliances
- Battery management

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

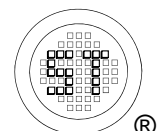
Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	$-I_D$	6	A
Pulsed Drain Current ¹⁾	$-I_{DM}$	30	A
Total Power Dissipation ²⁾	P_{tot}	2	W
Operating Junction and Storage Temperature Range	T_j, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Ambient ²⁾	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

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

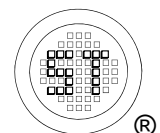
²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.



MD02P035USK4

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
Gate Voltage Drain Current at $-V_{DS} = 16\ \text{V}$	$-I_{DSS}$	-	-	1	μA
Gate-Source Leakage at $V_{GS} = \pm 10\ \text{V}$	I_{GSS}	-	-	± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250\ \mu\text{A}$	$-V_{GS(th)}$	0.4	-	1.5	V
Drain-Source On-State Resistance at $-V_{GS} = 4.5\ \text{V}$, $-I_D = 4\ \text{A}$ at $-V_{GS} = 2.5\ \text{V}$, $-I_D = 4\ \text{A}$ at $-V_{GS} = 1.8\ \text{V}$, $-I_D = 2\ \text{A}$	$R_{DS(on)}$	-	-	35 45 62	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS} = 5\ \text{V}$, $-I_D = 4\ \text{A}$	g_{fs}	-	16	-	S
Gate resistance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g	-	4.4	-	Ω
Input Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	1242	-	pF
Output Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	188	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	148	-	pF
Total Gate Charge at $-V_{GS} = 4.5\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$ at $-V_{GS} = 2.5\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$	Q_g	-	13 7.8	-	nC
Gate-Source Charge at $-V_{GS} = 4.5\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$	Q_{gs}	-	3	-	nC
Gate-Drain Charge at $-V_{GS} = 4.5\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$	Q_{gd}	-	3	-	nC
Turn-On Delay Time at $-V_{GS} = 10\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$, $R_G = 3.3\ \Omega$	$t_{d(on)}$	-	10	-	ns
Turn-On Rise Time at $-V_{GS} = 10\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$, $R_G = 3.3\ \Omega$	t_r	-	34	-	ns
Turn-Off Delay Time at $-V_{GS} = 10\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$, $R_G = 3.3\ \Omega$	$t_{d(off)}$	-	21	-	ns
Turn-Off Fall Time at $-V_{GS} = 10\ \text{V}$, $-V_{DS} = 10\ \text{V}$, $-I_D = 4\ \text{A}$, $R_G = 3.3\ \Omega$	t_f	-	7	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 1\ \text{A}$	$-V_{SD}$	-	-	1	V
Body-Diode Continuous Current	$-I_S$	-	-	6	A
Body Diode Reverse Recovery Time at $-I_S = 4\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$	t_{rr}	-	10.4	-	ns
Body Diode Reverse Recovery Charge at $-I_S = 4\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$	Q_{rr}	-	1.7	-	nC



Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

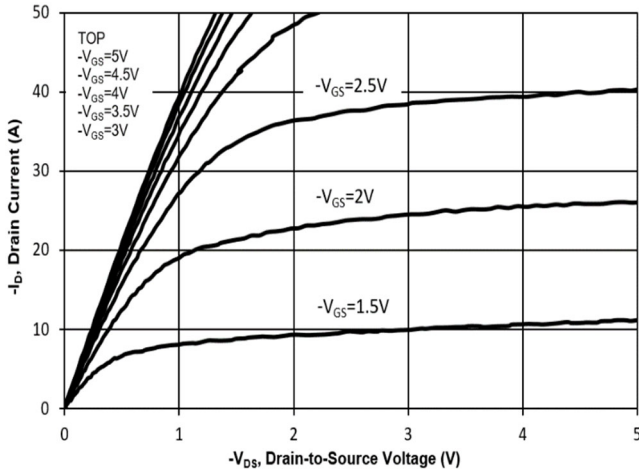


Fig. 2 Typical Transfer Characteristics

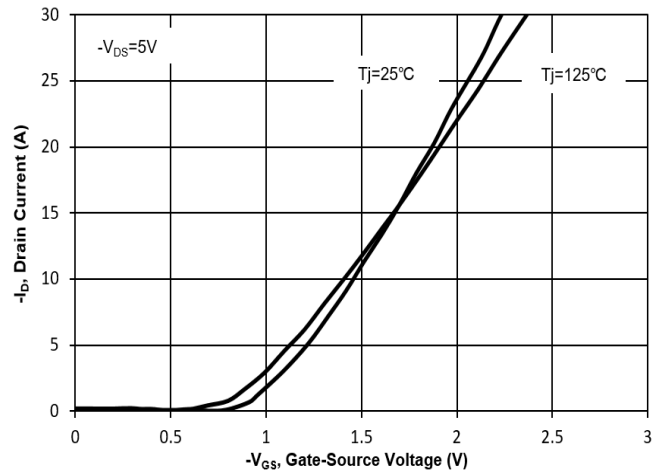


Fig. 3 On-Resistance vs. Drain Current

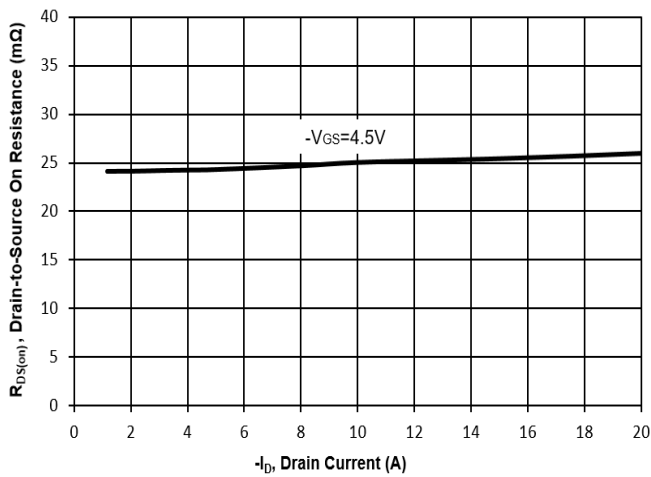


Fig. 4 on-Resistance vs. Gate to Source Voltage

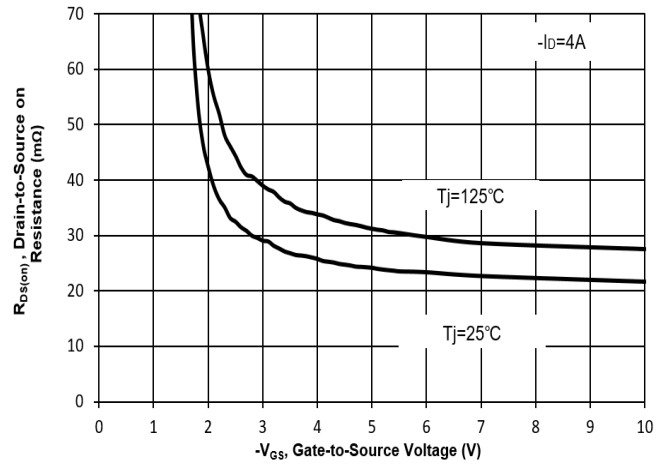


Fig. 5 On-Resistance vs. T_J

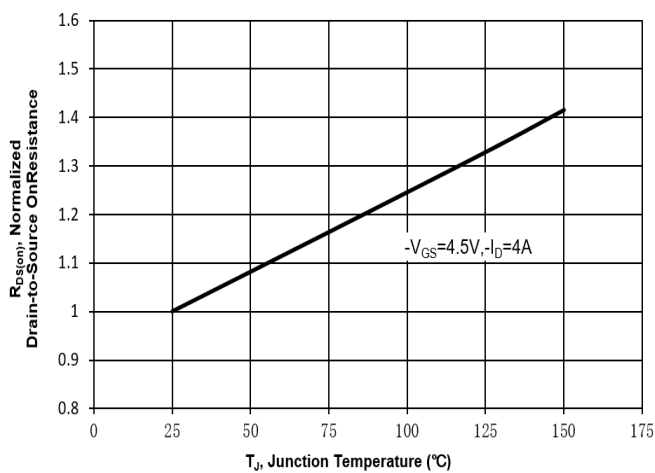
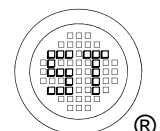
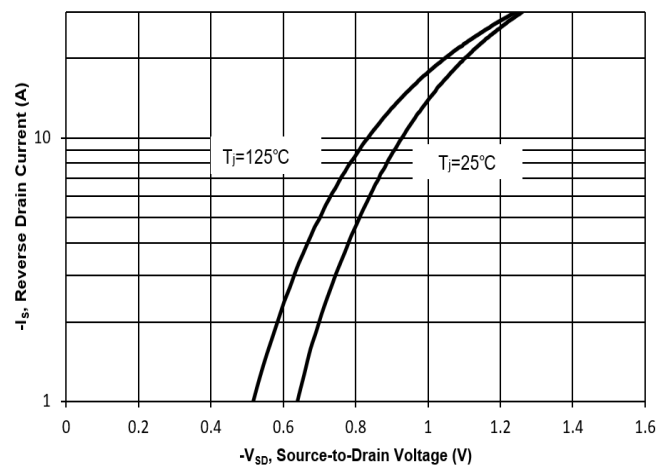


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

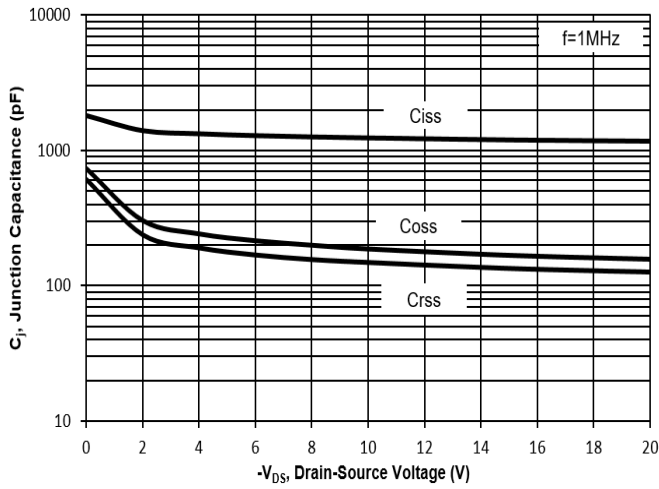


Fig. 8 Drain-Source Leakage Current vs. T_j

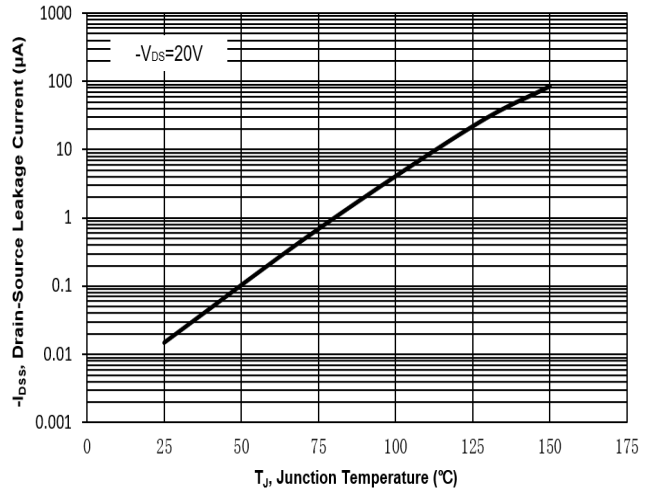


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

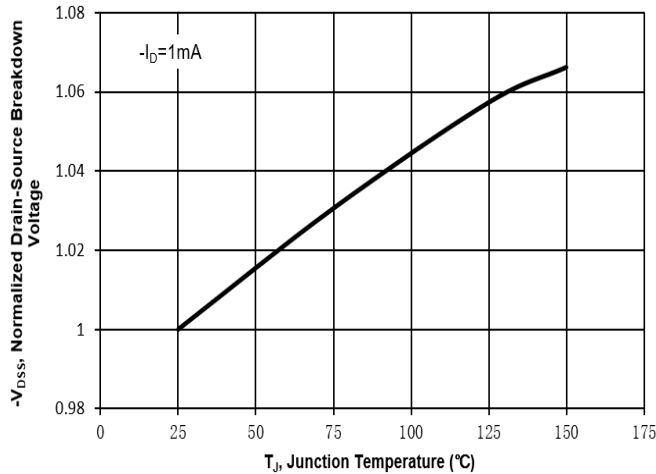


Fig. 10 Gate-Source Threshold Voltage vs. T_j

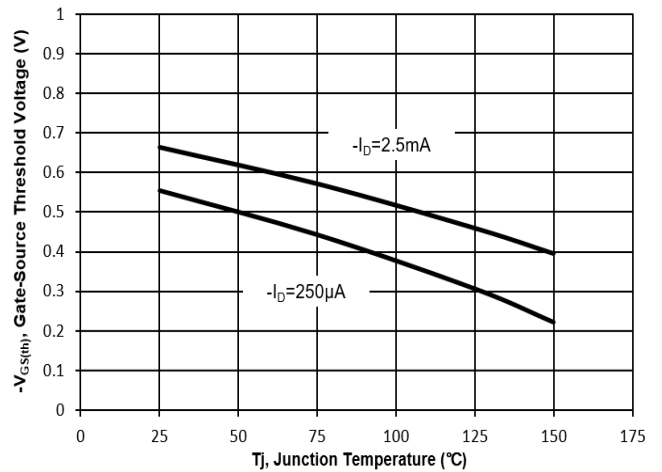
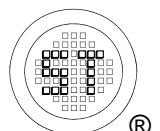
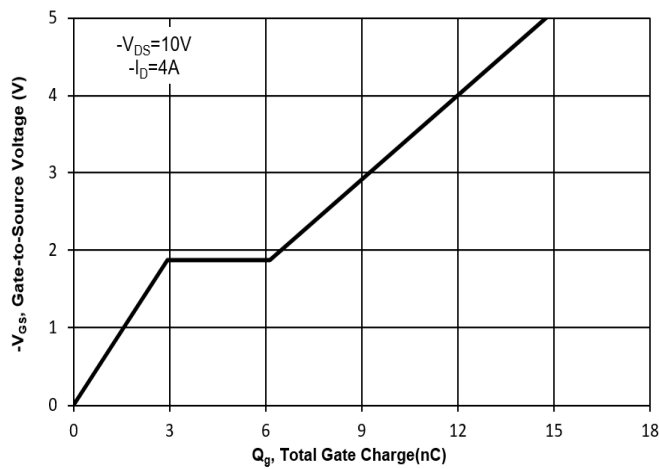


Fig. 11 Gate Charge



Test Circuits

Fig.1-1 Switching times test circuit

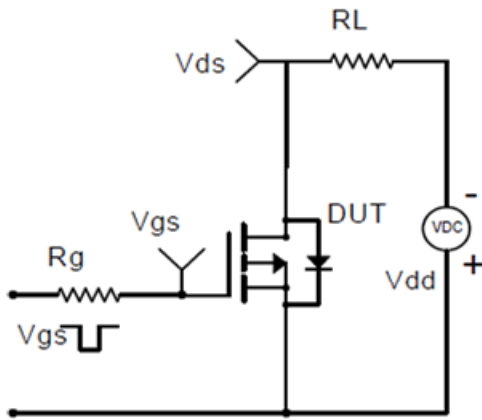


Fig.1-2 Switching Waveform

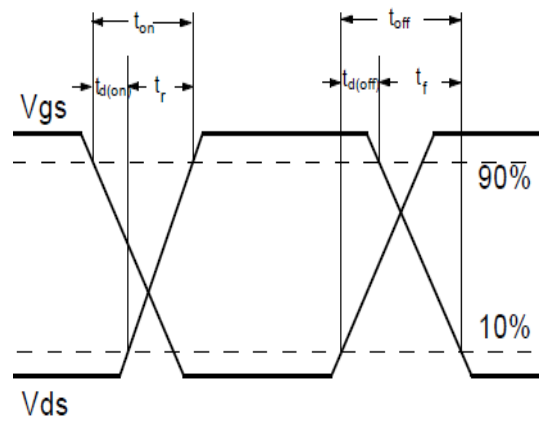


Fig.2-1 Gate charge test circuit

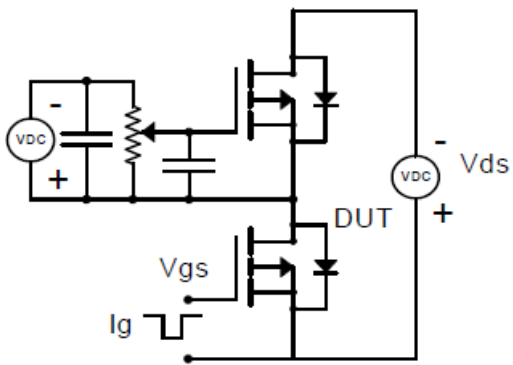
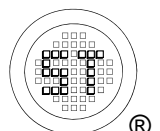
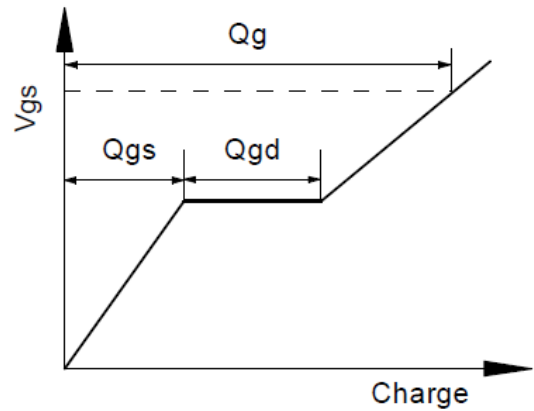


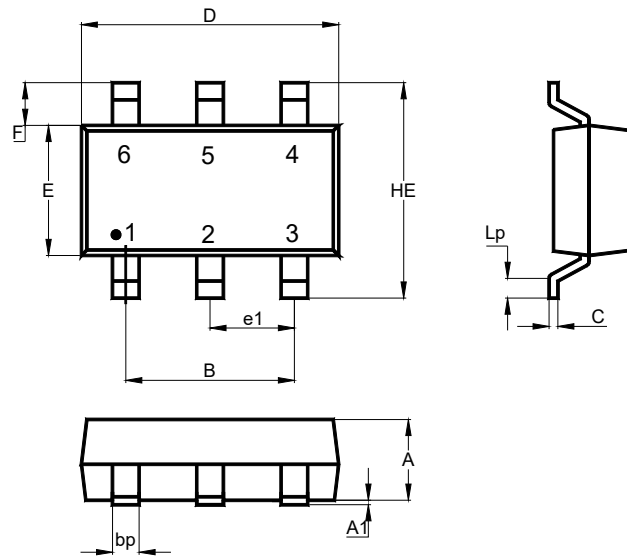
Fig.2-2 Gate charge waveform



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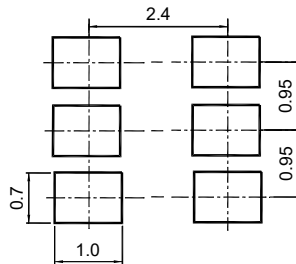
Package Outline (Dimensions in mm)

SOT-26



Unit	A	A1	B	C	D	E	e1	F	HE	Lp	bp
mm	1.2	0.1	2.1	0.20	3.1	1.7	0.95	0.65	3.0	0.6	0.5
	1.0	0	1.7	0.08	2.7	1.3	typ.	0.6	2.6	0.2	0.3

Recommended Soldering Footprint

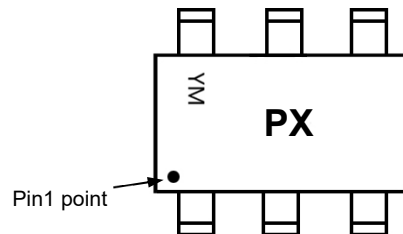


Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-26	8	4 ± 0.1	0.157 ± 0.004	178	7	3,000

Marking information

- "PX" = Part No.
 - "YM" = Date Code Marking
 - "Y" = Year
 - "M" = Month
- Font type: Arial



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