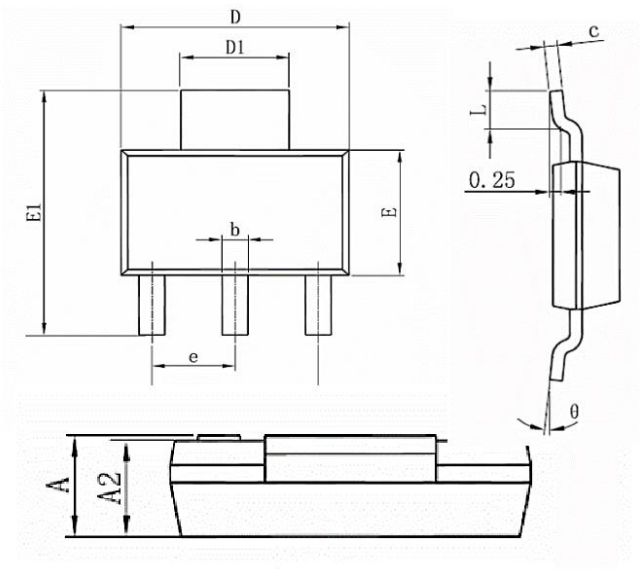
N-Channel Enhancement Mode MOSFET

Primary characteristics			
Symbol	**Parameter**	**Value**	**Unit**
I_D	Continuous drain current @T_A=25°C	6.1	A
V_{DSS}	Drain source voltage	60	V
R_{DSON}	Static drain-source on-resistance	50	mΩ MAX

Features

- **SOT-223** case for easy automatic insertion
- Pb-free and **RoHS** compliant
- Low $R_{DS(ON)}$
- Advanced high cell density trench technology
- JESD22-A114-B ESD rating of class 1B per human body model
- Molding compound: UL Flammability Classification Rating 94V-0
- Terminals: matte tin-plated leads; solderability-per MIL-STD-202, method 208

Case dimensions



SOT-223

Unit	A	A2	b	c	D	D1	E	e	e1	L	θ
mm	1.66 ±0.14	1.6 ±0.1	0.74 ±0.08	0.30 ±0.05	6.3 ±0.1	3.0 ±0.1	3.5 ±0.2	2.3 (BSC)	4.6 ±0.1	1.0 +0.15 -0.10	5° ±5

Maximum ratings (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Drain-source voltage	V_{DSS}	60	V
Gate-source voltage	V_{GSS}	±20	V
Continuous drain current (T_A=25°C) [1]	I_D	6.1	A
Continuous drain current (T_A=70°C) [1]		4.9	
Pulsed drain current (t_p=10µs, T_A=25°C)	I_{DM}	24.4	A
Single pulse avalanche energy [3]	E_{AS}	60	mJ
Power Dissipation (T_A=25°C, $R_{\theta JA}$=32°C/W) [1]	P_D	3.9	W
Operating junction and storage temperature range	T_J, T_{STG}	-55 ~ 150	°C

Dynamic electrical characteristics

Characteristic	Symbol	Value			Unit
		Min.	Typ.	Max.	
Thermal resistance junction to air [1]	$R_{\theta JA}$	-	32	48	°C/W
Thermal resistance junction to case [1]	$R_{\theta JC}$	-	11.5	18	

Electrical characteristics (T_A = 25°C)						
Characteristic	**Test condition**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Drain-source breakdown voltage	V_{GS}=0V, I_D=250µA	V_{DSS}	60	-	-	V
Zero gate voltage drain current	V_{DS}=60V, V_{GS}=0V	I_{DSS}	-	-	1.0	µA
Gate body leakage current	V_{GS}=±20V, V_{DS}=0V	I_{GSS}	-	-	±100	nA
Gate threshold voltage	V_{DS}=V_{GS}, I_D=250µA	$V_{GS(TH)}$	1.0	2.0	3.0	V
Drain-source on-state resistance [2]	V_{GS}=10V, I_D=10A	$R_{DS(ON)}$	-	-	50	mΩ
Gate resistance	V_{GS}=0V, f=1.0MHz	R_G	-	4.5	-	Ω

Dynamic electrical characteristics						
Characteristic	**Test condition**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Input capacitance	V_{DS}=25V V_{GS}=0V f=1.0MHz	C_{ISS}	-	880	-	pF
Output capacitance		C_{OSS}	-	75	-	
Reverse transfer capacitance		C_{RSS}	-	55	-	

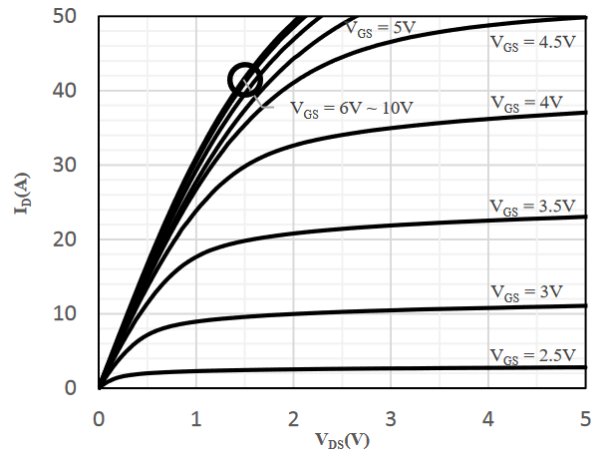
Switching characteristics						
Characteristic	**Test condition**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Turn ON delay time [4]	V_{DD}=30V V_{GS}=10V I_D=20A R_G=9.1Ω	$t_{d(ON)}$	-	9.5	-	ns
Turn ON rise time [4]		t_r	-	60.5	-	
Turn OFF delay time [4]		$t_{d(OFF)}$	-	27.1	-	
Turn OFF fall time [4]		t_f	-	37.1	-	
Total gate-charge	V_{DD}=80V V_{GS}=10V I_D=20A	Q_G	-	23	-	nC
Gate to source charge		Q_{GS}	-	4.5	-	
Gate to drain (Miller) charge		Q_{GD}	-	5.5	-	

Source-drain diode characteristics						
Characteristic	**Test condition**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Diode forward voltage [2]	I_{SD}=20A, V_{GS}=0V	V_{SD}	-	-	1.2	V
Reverse recovery time	I_F=20A, V_{GS}=0V d_{IF}/d_t=100A/µs	trr	-	25	-	ns
Reverse recovery charge		Qrr	-	20	-	nC

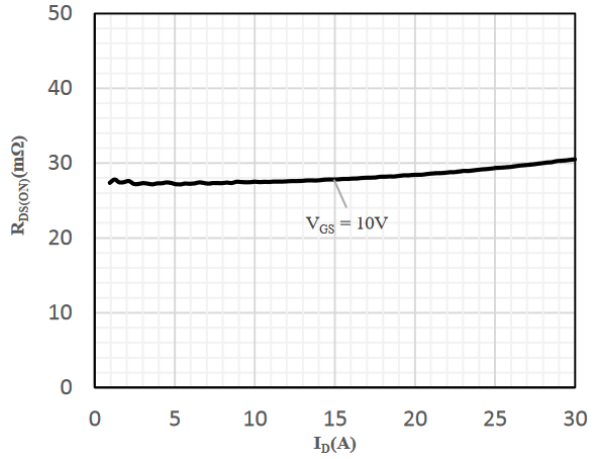
Notes:
1) The data tested by surface mounted on a 1 inch^2 FR-4 board with 2oz copper
2) The data tested by pulsed, pulse width ≤300µs, duty cycle ≤2%
3) The E_{AS} data shows max. rating. The test condition is V_{DD}=30V, V_{GS}=10V, L=10mH
4) Guaranteed by design, not subject to production

Typical characteristics

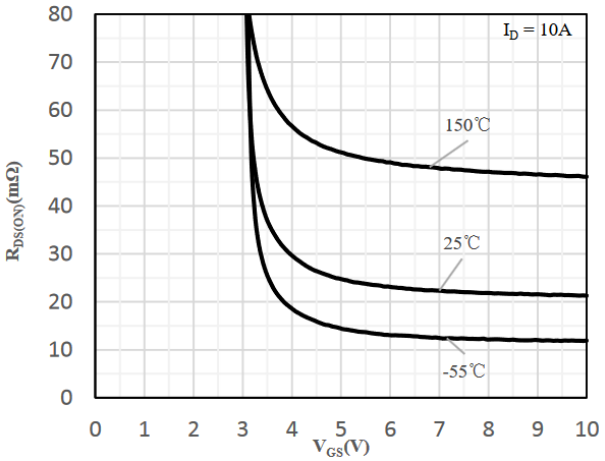
Typical output characteristics



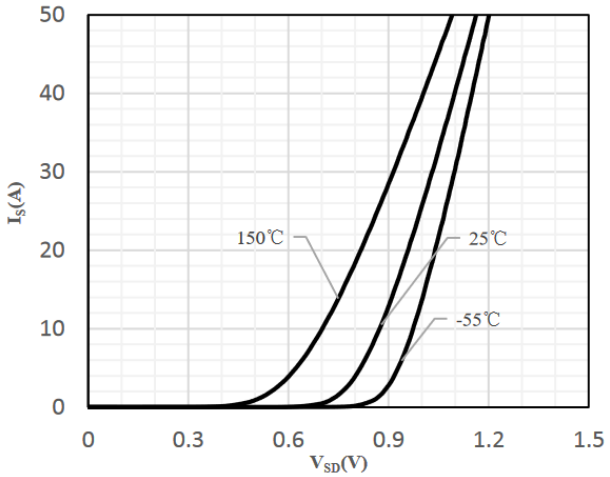
ON resistance vs. drain current and gate voltage



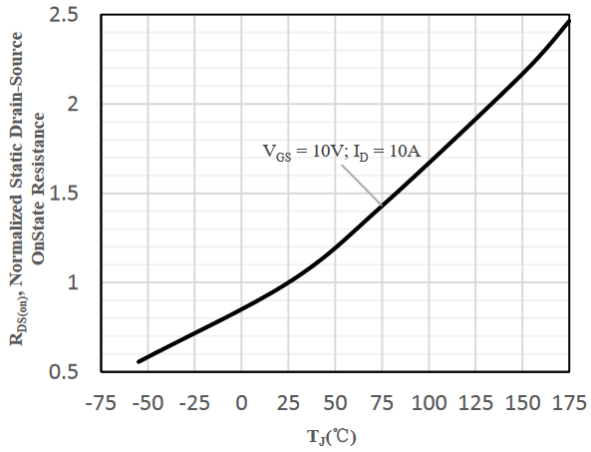
ON resistance vs. gate-source voltage



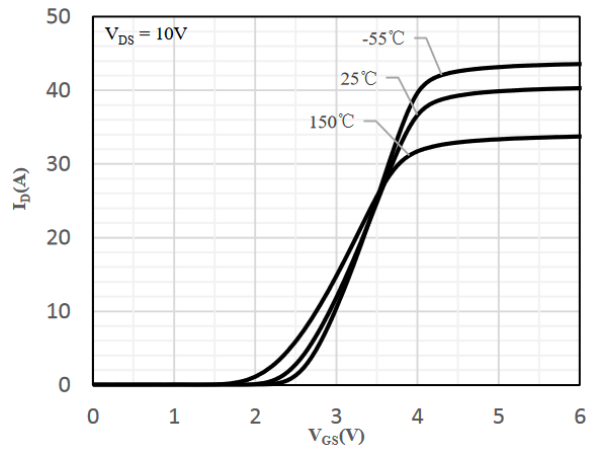
Body-diode characteristics



Normalized ON-resistance vs. junction temperature

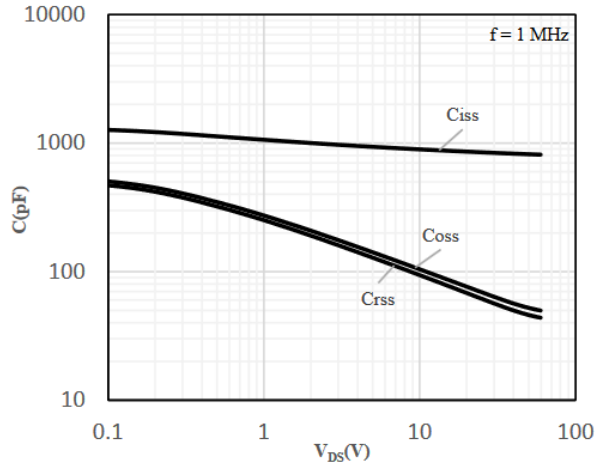


Transfer characteristics

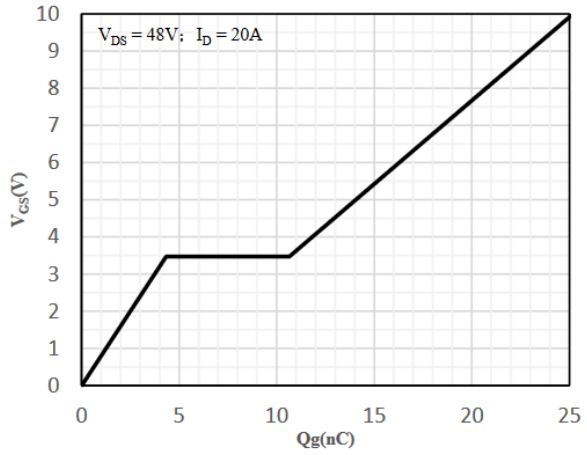


Typical characteristics

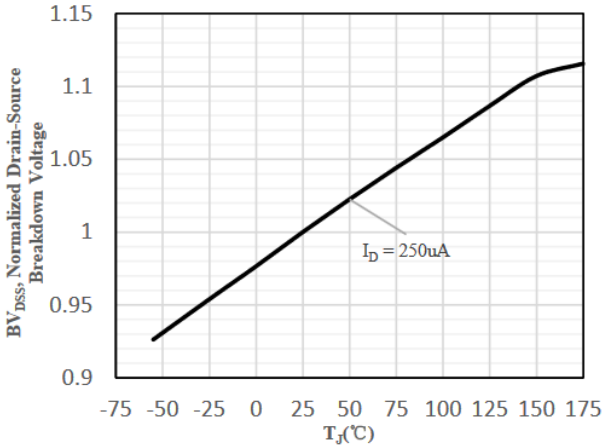
Capacitance characteristics



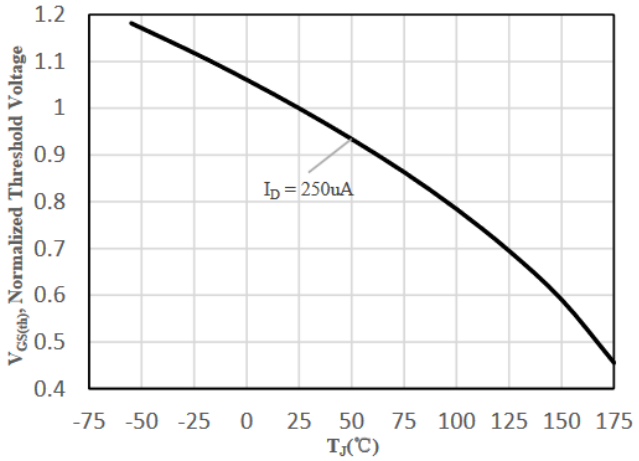
Gate-charge characteristics



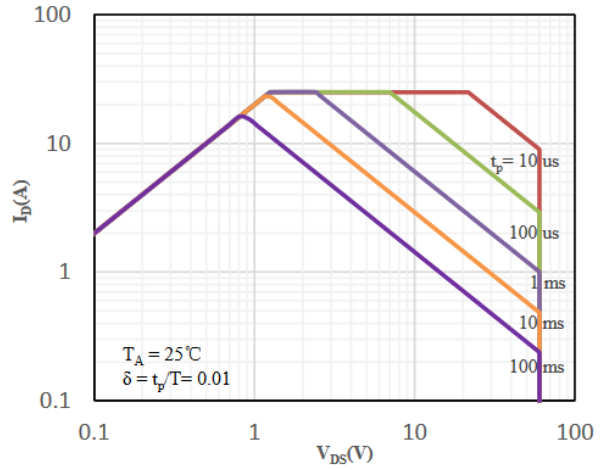
Normalized breakdown voltage vs. junction temperature



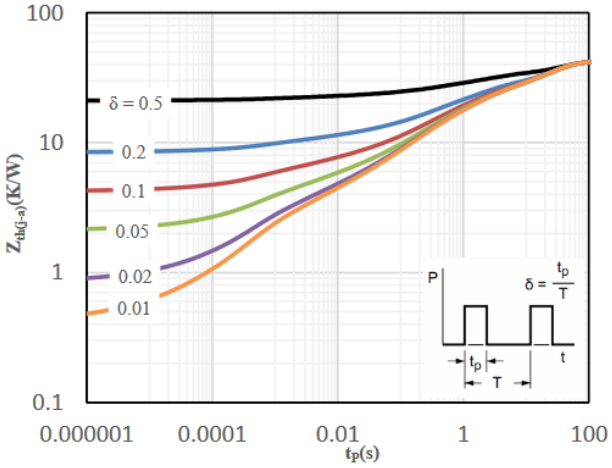
Normalized $V_{GS(TH)}$ vs. junction temperature



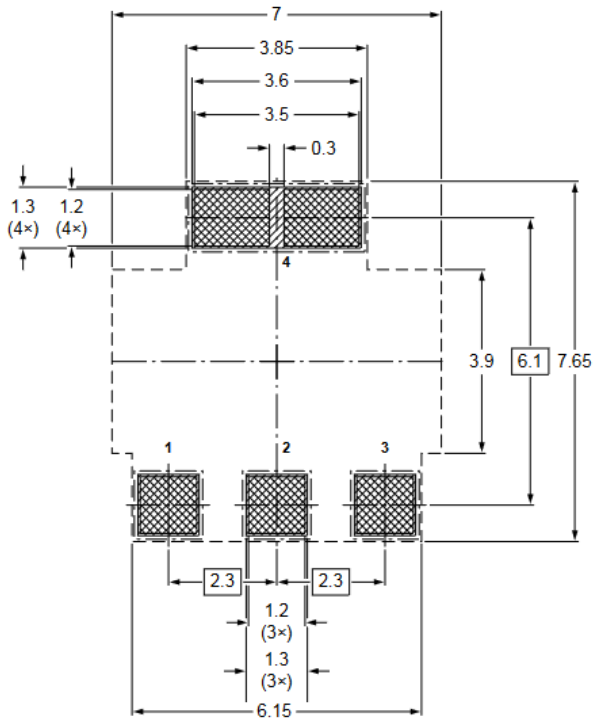
Safe operation area



Maximum transient thermal impedance



Suggested soldering pad layout



SOT-223

Ordering information			
Part Number	**Package**	**Shipping Quantity**	**Dimensions**
AKS500N06R	SOT-223	**4000 pcs / tape & reel**	---

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