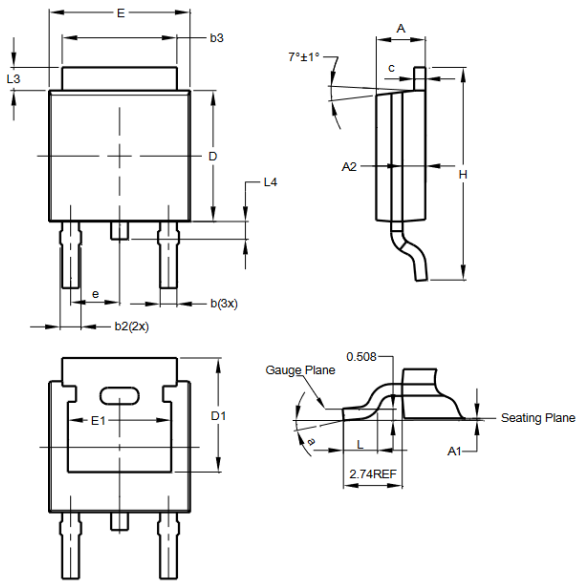
N-Channel Enhancement Mode MOSFET

Primary characteristics			
Symbol	**Parameter**	**Value**	**Unit**
I_D	Continuous drain current	50	A
V_{DSS}	Drain source voltage	100	V
R_{DSON}	Static drain-source on-resistance	25	mΩ MAX

Features

- **TO-252 (D-PAK)** case for easy automatic insertion
- Pb-free and **RoHS** compliant
- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Molding compound: UL Flammability Classification Rating 94V-0
- Terminals: matte tin-plated leads; solderability-per MIL-STD-202, method 208

Case dimensions



TO-252 (D-PAK)

	A	A1	A2	b	b2	b3	c	D	D1	e	E
TYP	2.29	0.08	1.07	0.783	0.95	5.33	0.531	6.1	-	2.286 BSC	6.58
MIN	2.19	0	0.97	0.64	0.76	5.21	0.45	6.0	5.21		6.45
MAX	2.39	0.13	1.17	0.88	1.14	5.5	0.58	6.2	-		6.7

	E1	H	L	L3	L4	a	
TYP	9.91	9.91	1.59	1.08	0.83	-	All measurements in mm
MIN	9.40	9.4	1.4	0.88	0.64	0°	
MAX	10.41	10.41	1.78	1.27	1.02	10°	

Maximum ratings (T_A = 25°C unless otherwise noted)			
Characteristic	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DSS}	100	V
Gate-source voltage	V_{GSS}	±20	V
Continuous drain current (T_C=25°C) [5]	I_D	50	A
Continuous drain current (T_C=100°C) [5]		32	
Continuous drain current (T_A=25°C)		8	
Continuous drain current (T_A=100°C)		5	
Pulsed drain current [1]	I_{DM}	180	A
Single pulse avalanche energy [3] [6]	E_{AS}	11	mJ
Power Dissipation (T_C=25°C) [2]	P_D	83	W
Operating junction temperature range	T_J, T_{STG}	-55 ~ 150	°C

Thermal characteristics

Characteristic	Test condition	Symbol	Value Min.	Value Typ.	Value Max.	Unit
Thermal resistance junction-case	-	$R_{\theta JC}$	-	1.5	-	°C/W
Thermal resistance junction-ambient [1) 4)]		$R_{\theta JA}$	-	55	-	°C/W

Electrical characteristics (T_A = 25°C)

Characteristic	Test condition	Symbol	Value Min.	Value Typ.	Value Max.	Unit
Drain-source breakdown voltage	V_{GS}=0V, I_D=250µA	V_{DSS}	100	-	-	V
Zero gate voltage drain current	V_{DS}=80V, 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	$V_{GS(TH)}$	1.2	1.8	2.5	V
Drain-source on-state resistance [2)]	V_{GS}=10V, I_D=20A	$R_{DS(ON)}$	-	14	17	mΩ
	V_{GS}=4.5V, I_D=10A		-	19	25	
Gate resistance	V_{DS}=V_{GS}=0V, f=1.0MHz	R_G	-	2.7	-	Ω

Dynamic electrical characteristics

Characteristic	Test condition	Symbol	Value Min.	Value Typ.	Value Max.	Unit
Input capacitance	V_{DS}=25V V_{GS}=10V f=1.0MHz	C_{ISS}	-	1102	-	pF
Output capacitance		C_{OSS}	-	537	-	
Reverse transfer capacitance		C_{RSS}	-	39	-	

Switching characteristics

Characteristic	Test condition	Symbol	Value Min.	Value Typ.	Value Max.	Unit
Turn ON delay time	V_{DS}=50V V_{GS}=10V I_D=40A R_G=3.3Ω	$t_{d(ON)}$	-	44	-	ns
Turn ON rise time		t_r	-	51	-	
Turn OFF delay time		$t_{d(OFF)}$	-	253	-	
Turn OFF fall time		t_f	-	112	-	
Total gate-charge	V_{DS}=80V V_{GS}=10V I_D=15A	Q_G	-	25	-	nC
Gate to source charge		Q_{GS}	-	6.4	-	
Gate to drain (Miller) charge		Q_{GD}	-	5.6	-	

Source-drain diode characteristics

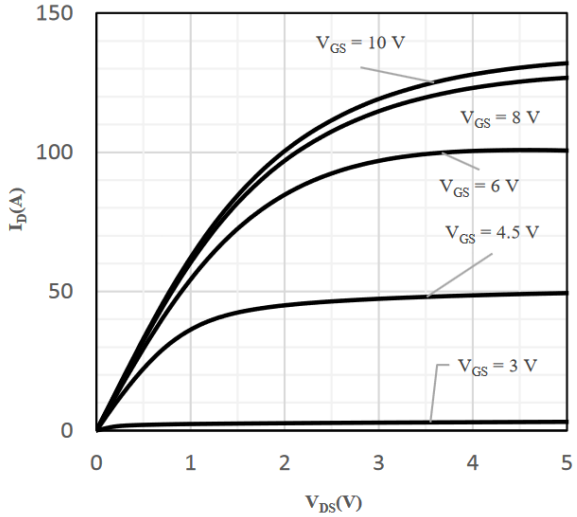
Characteristic	Test condition	Symbol	Value Min.	Value Typ.	Value Max.	Unit
Diode forward voltage [2)]	I_{SD}=15A, V_{GS}=0V	V_{SD}	-	0.88	1.0	V
Reverse recovery time	I_{SD}=15A, V_R=30V dI_{SD}/d_t=100A/µs	trr	-	45	-	ns
Reverse recovery charge		Qrr	-	50	-	nC

Notes:

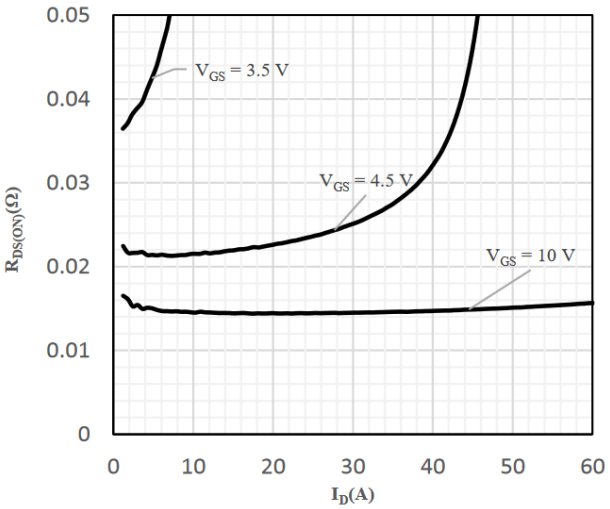
1) The value of $R_{\theta JC}$ is measured in a still air environment with T_A=25°C and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design
2) The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used
3) Single pulse width limited by junction temperature $T_{J(MAX)}$=150°C
4) The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient
5) The maximum current rating is package limited
6) The E_{AS} data shows max. rating. The test condition is V_{DS}=50V, V_{GS}=10V, L=0.5mH, I_{AS} = 6.0A

Typical characteristics

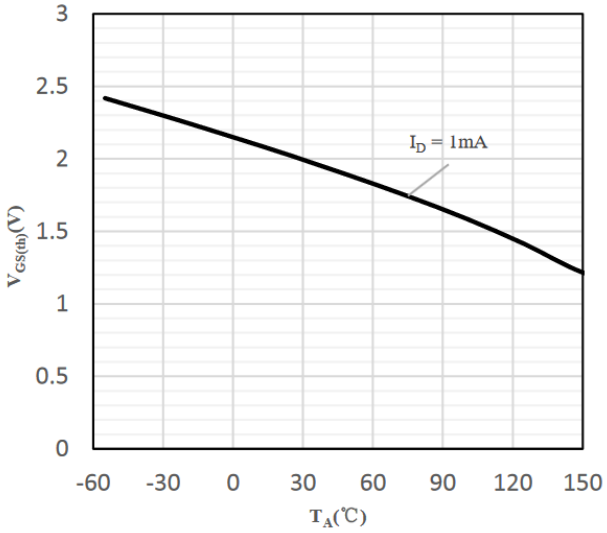
Typical output characteristics



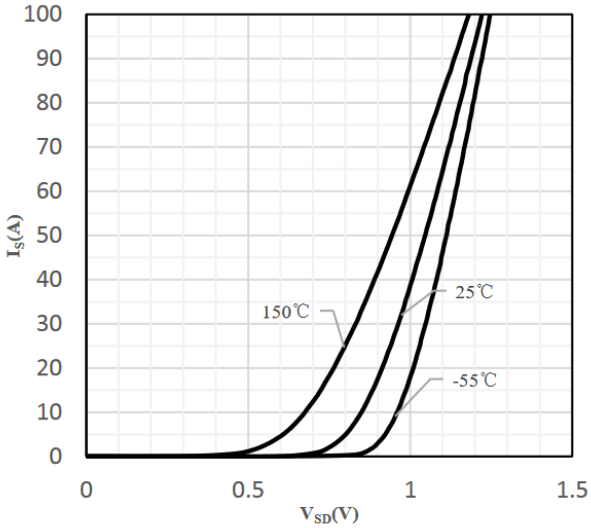
On-resistance vs. drain current



Gate threshold voltage vs. junction temperature

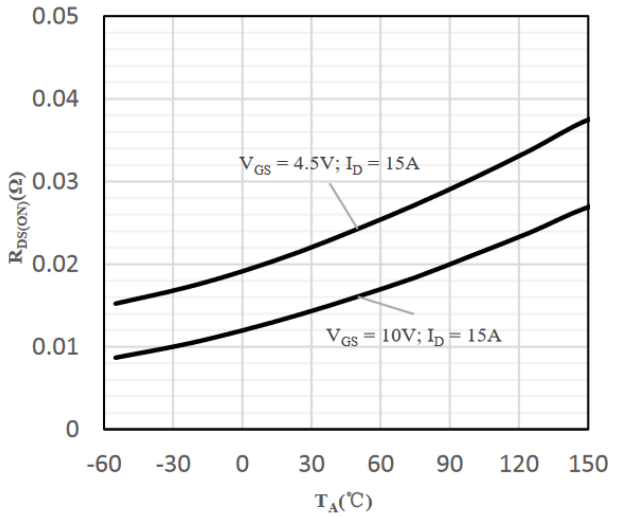


Body-diode characteristics

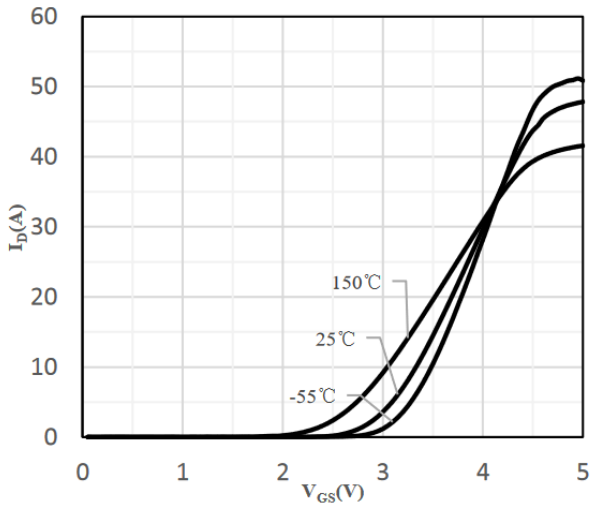


Typical characteristics

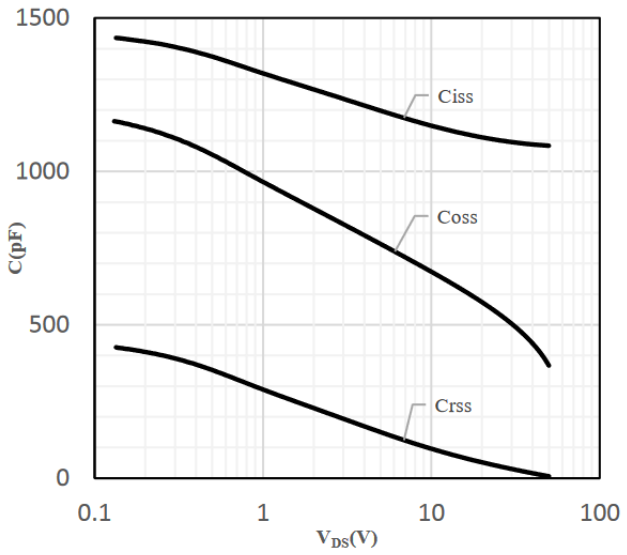
ON-resistance vs. junction temperature



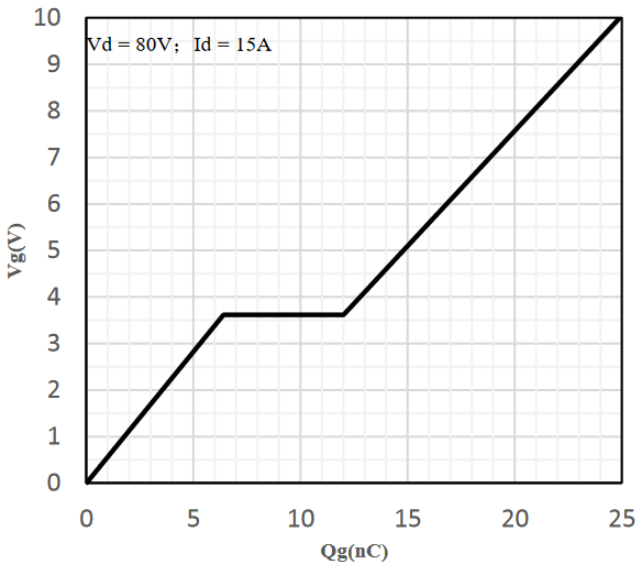
Transfer characteristics



Capacitance characteristics

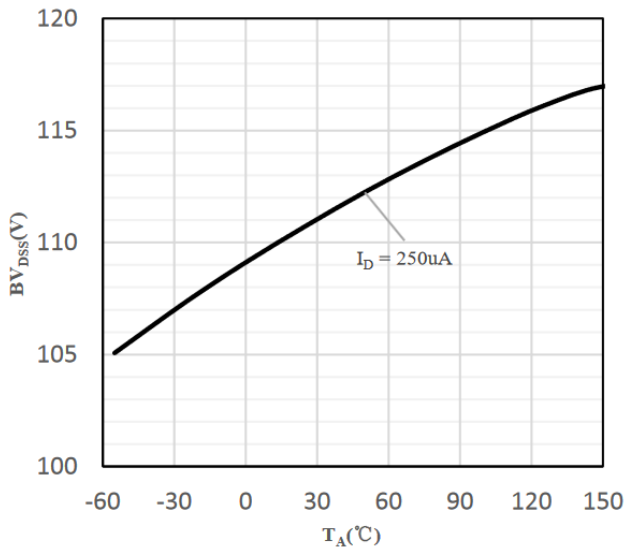


Gate-charge characteristics

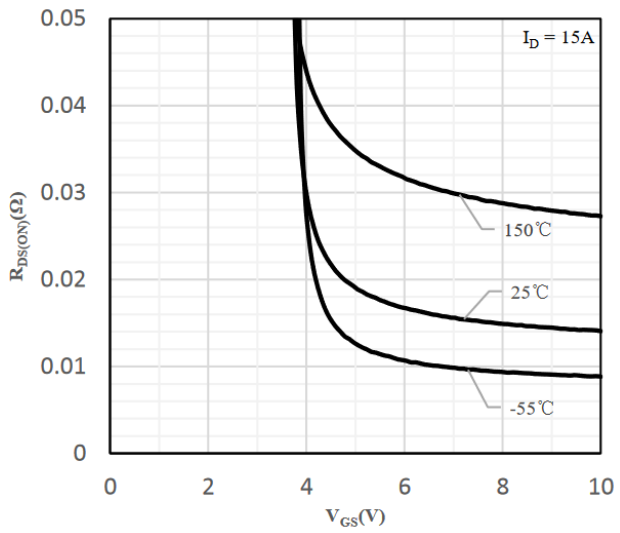


Typical characteristics

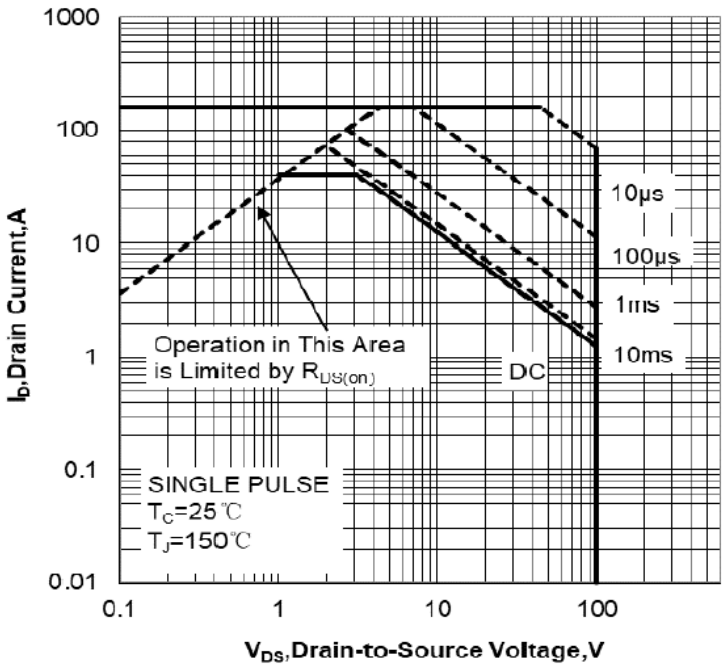
Normalized breakdown voltage vs. air temperature



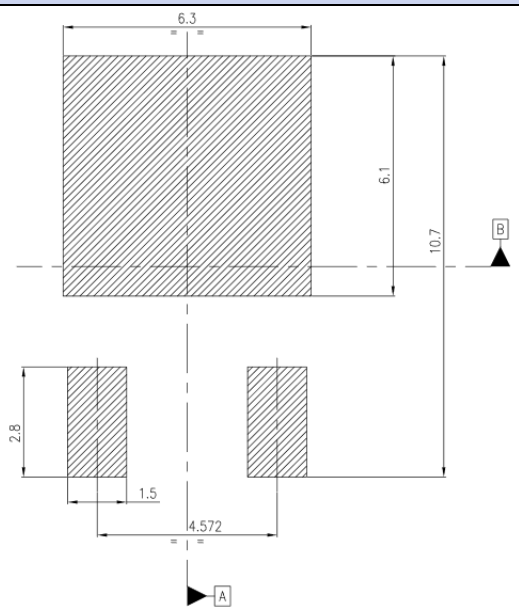
ON-resistance vs. gate-source voltage



Maximum safe operating area



Suggested soldering pad layout



TO-252 (D-PAK)

Ordering information

Part Number	Marking	Package	Shipping Quantity	Dimensions
AKS170N10TD	170N10TD	TO-252	**80 pcs / tube** **2500 pcs / tape & reel**	---

Disclaimer

Akyga semi reserves the right to make changes without notice to any product specification herein, to make corrections, modifications, enhancements or other changes. Akyga semi or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies. Data sheet specifications and its information contained are intended to provide a product description only. "Typical" parameters which may be included on Akyga semi data sheets and/ or specifications can and do vary in different applications and actual performance may vary over time. Akyga semi does not assume any liability arising out of the application or use of any product or circuit. Akyga semi products are not designed, intended or authorized for use in medical, life-saving implant or other applications intended for life-sustaining or other related applications where a failure or malfunction of component or circuitry may directly or indirectly cause injury or threaten a life without expressed written approval of Akyga semi. Customers using or selling Akyga semi components for use in such applications do so at their own risk and shall agree to fully indemnify Akyga semi and its subsidiaries harmless against all claims, damages and expenditures.