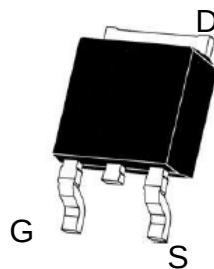
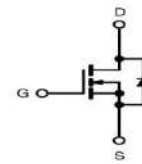


650V N-Channel Super-Junction MOSFET
Features

- Super-Junction MOSFET
- Low ON Resistance
- Improved dv/dt Capability
- 100% Avalanche Tested
- RoHS compliant

Applications

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- LED Lighting
- Adapter


TO-252 top view

Schematic diagram

Product Summary

V_{DS}	650	V
$R_{DS(on),TYP} @ V_{GS}=10\text{ V}$	850	mΩ
I_D	4	A

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain to Source Voltage	V_{DSS}	650	V
Continuous Drain Current (@ $T_C=25^\circ\text{C}$)	I_D	4 ⁽¹⁾	A
Continuous Drain Current (@ $T_C=100^\circ\text{C}$)		4.2 ⁽¹⁾	A
Drain current pulsed ⁽²⁾	I_{DM}	16 ⁽¹⁾	A
Gate to Source Voltage	V_{GS}	± 30	V
Single pulsed Avalanche Energy ⁽³⁾	E_{AS}	67.5	mJ
MOSFET dv/dt Ruggedness($V_{DS}=0\sim 400\text{V}$)	dv/dt	40	V/ns
Peak diode Recovery dv/dt ⁽⁴⁾	dv/dt	15	V/ns
Total power dissipation (@ $T_C=25^\circ\text{C}$)	P_D	38	W
Derating Factor above 25°C		0.3	W/ $^\circ\text{C}$
Operating Junction Temperature & Storage Temperature	T_{STG}, T_J	-55 to + 150	$^\circ\text{C}$
Maximum lead temperature for soldering purpose	T_L	260	$^\circ\text{C}$

Notes

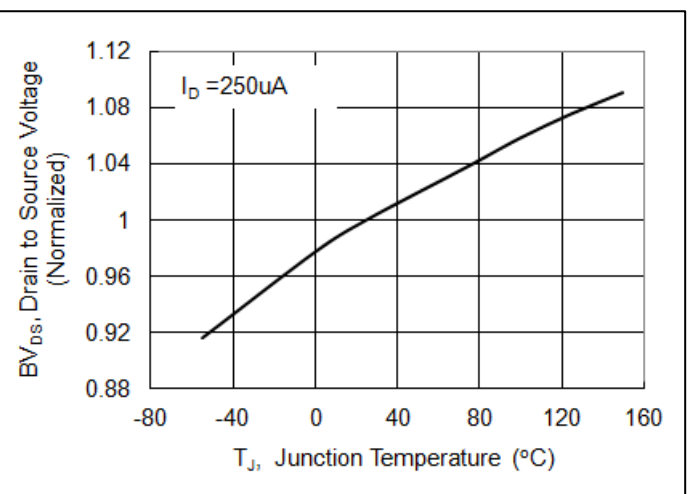
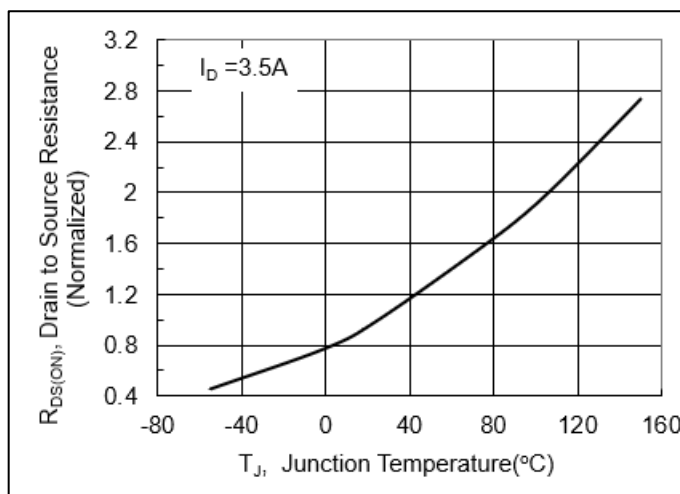
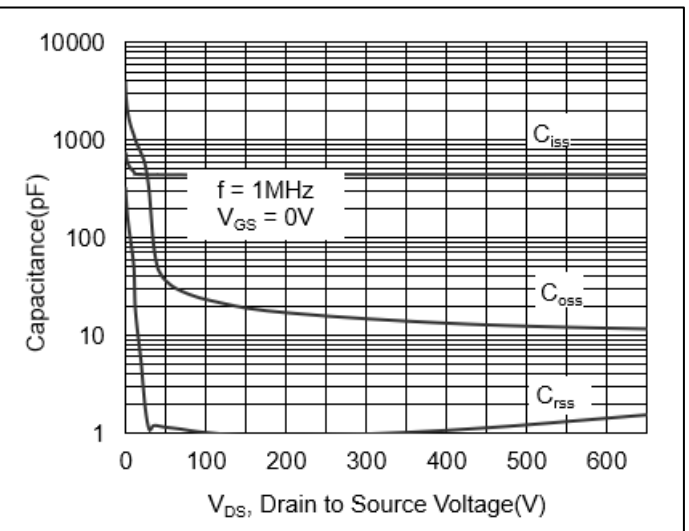
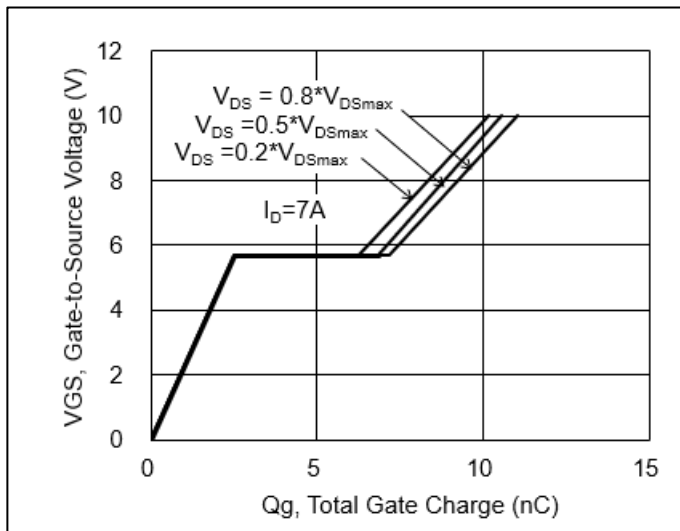
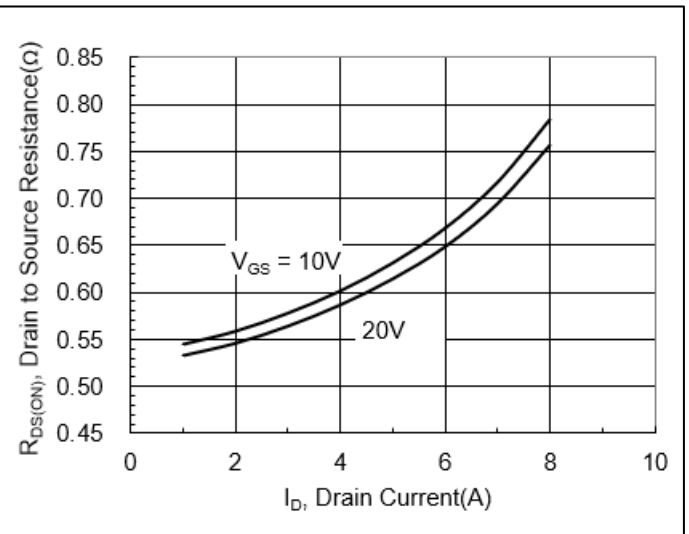
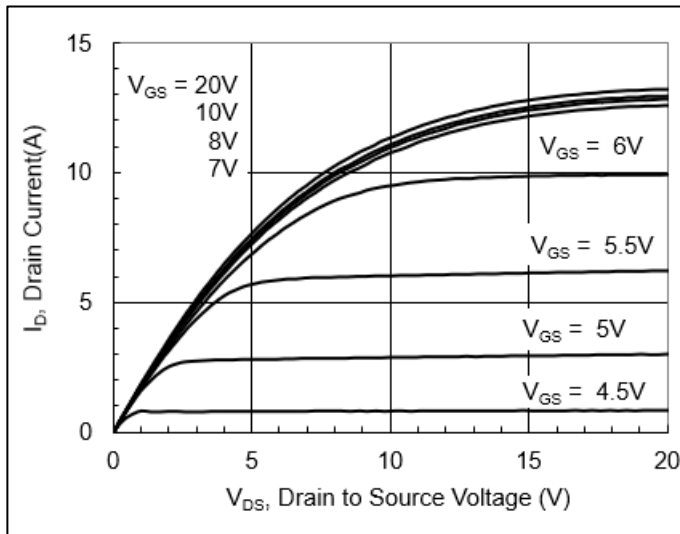
1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. $L = 60\text{mH}$, $I_{AS} = 1.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting at $T_J = 25^\circ\text{C}$
4. $I_{SD} \leq I_D$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{DD} \leq 400\text{V}$, Starting at $T_J = 25^\circ\text{C}$

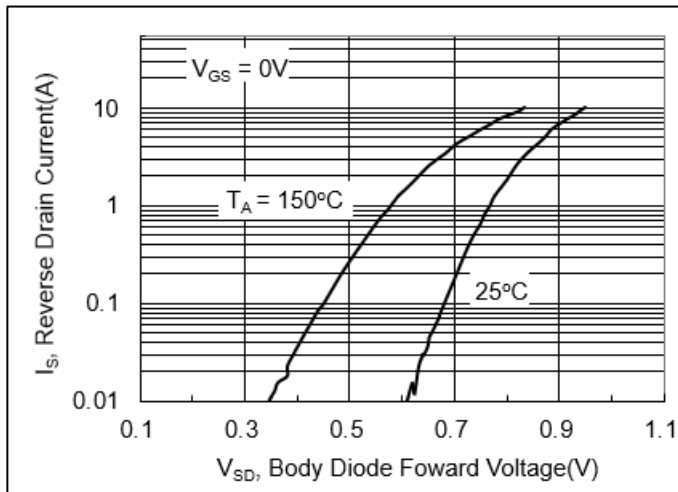
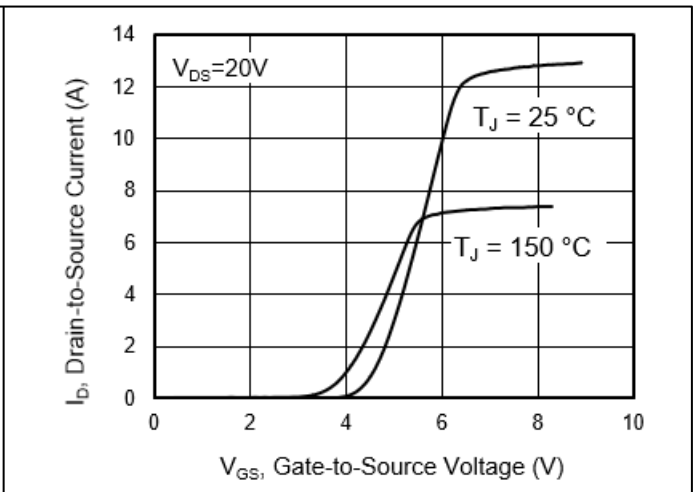
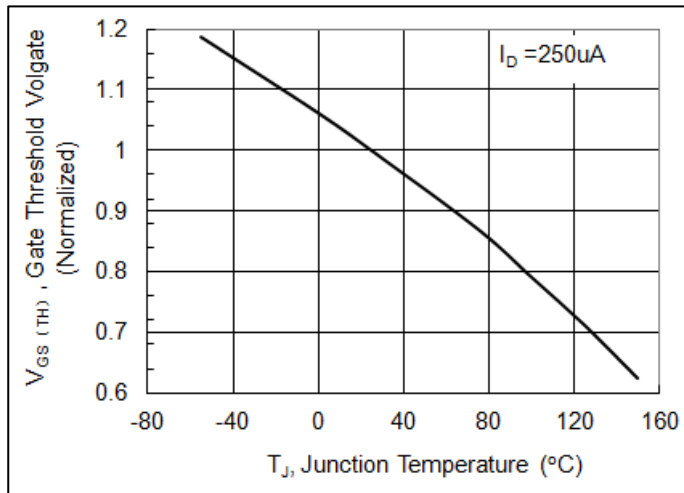
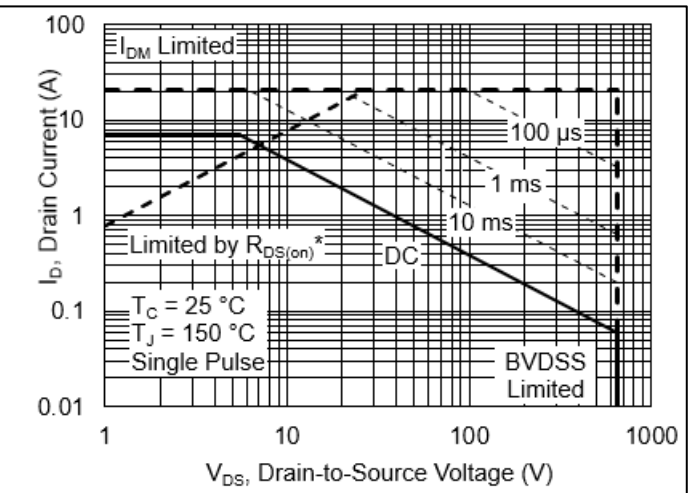
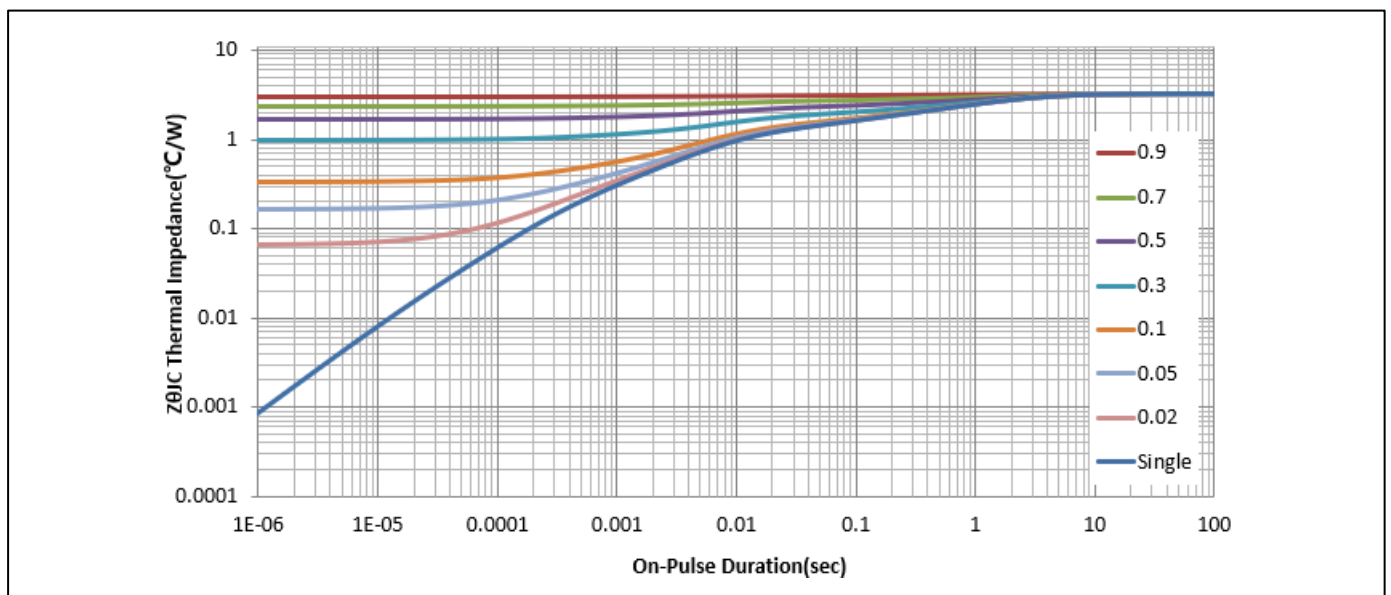
THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal resistance, Junction to case (Maximum)	R_{thjc}	3.3	$^\circ\text{C}/\text{W}$
Thermal resistance, Junction to ambient(Maximum)	R_{thja}	67	$^\circ\text{C}/\text{W}$

650V N-Channel Super-Junction MOSFET
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

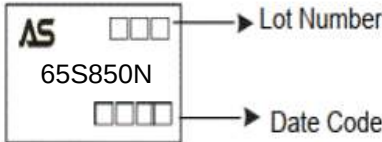
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain to source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	650	--	--	V
Breakdown voltage temperature coefficient	ΔBV _{DSS} / ΔT _J	I _D =250uA, referenced to 25°C	--	0.7	--	V/°C
Drain to source leakage current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	--	1	uA
		V _{DS} =520V, T _C =125°C	--	--	10	uA
Gate to source leakage current, forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V	--	--	100	nA
Gate to source leakage current, reverse		V _{GS} =-30V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250uA	2.0	3.0	4.0	V
Drain to source on state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =2.5A	--	850	900	mΩ
Forward Transconductance	G _{fs}	V _{DS} =10V, I _D =2.5A	--	5.8	--	S
Dynamic Characteristics						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =100V, f=1MHz	--	312	--	pF
Output capacitance	C _{oss}		--	12	--	
Reverse transfer capacitance	C _{rss}		--	2	--	
Turn on delay time	t _{d(on)}	V _{DS} =350V, I _D =4A , R _G =25Ω, V _{GS} =10V	--	9	--	ns
Rising time	t _r		--	9	--	
Turn off delay time	t _{d(off)}		--	23	--	
Fall time	t _f		--	81	--	
Total gate charge	Q _g	V _{DS} =350V, V _{GS} =10V, I _D =4A	--	7.6	--	nC
Gate-source charge	Q _{gs}		--	2.1	--	
Gate-drain charge	Q _{gd}		--	2.4	--	
Gate Resistance	R _g	V _{DS} =0V, Scan F mode	--	15	--	Ω
SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous source current	I _S	Integral reverse p-n Junction diode in the MOSFET	--	--	4	A
Pulsed source current	I _{SM}		--	--	16	A
Diode forward voltage drop.	V _{SD}	I _S =4A, V _{GS} =0V	--	--	1.4	V
Reverse recovery time	T _{rr}	I _S =4A, V _{GS} =0V,	--	131	--	ns
Reverse recovery Charge	Q _{rr}	dI _F /dt=100A/us	--	632	--	nC

650V N-Channel Super-Junction MOSFET


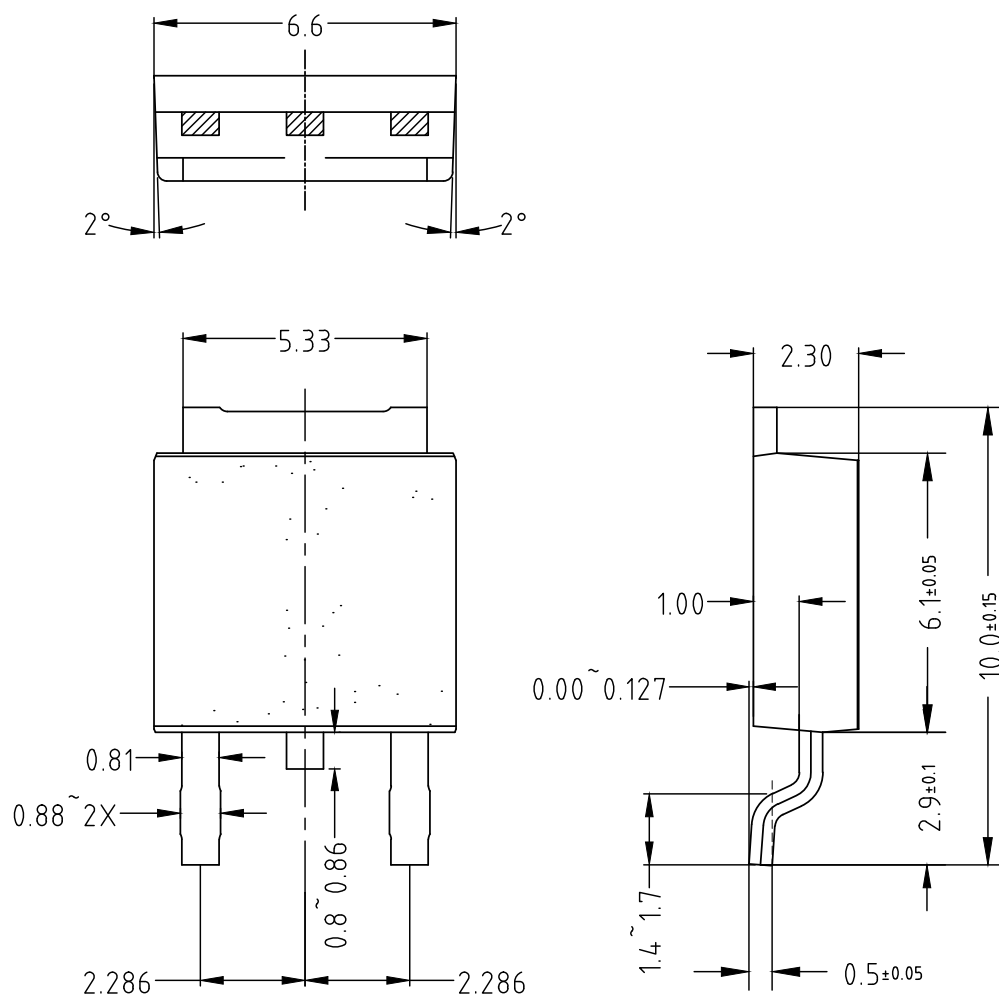
650V N-Channel Super-Junction MOSFET

Fig 7. Forward characteristics of reverse diode

Fig 8. Transfer characteristics

Fig 9. $V_{GS(TH)}$ vs junction temperature

Fig 10. Safe operating area

Fig 11. Transient thermal impedance

Ordering and Marking Information

Ordering Device No.	Marking	Package	Packing	Quantity
ASDM65S850NKQ-R	65S850N	TO-252	Tape&Reel	2500/Reel

PACKAGE	MARKING
TO-252	 The diagram shows a rectangular marking area on a TO-252 package. It contains the ASDsemi logo (AS) and the part number 65S850N. Above the part number are three empty boxes labeled 'Lot Number' with an arrow pointing to them. Below the part number are three empty boxes labeled 'Date Code' with an arrow pointing to them.

TO-252



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