

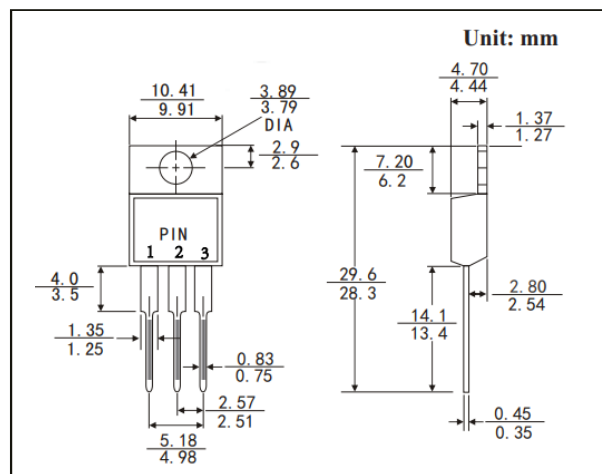
TO-220AB N-Channel Super Junction MOSFET

Features

- Lower $R_{DS(on)}$
- Lower C_{rss}
- Fast switching

Applications

- PWM Application
- Load Switch
- EV Charger
- Power Management



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage	650	V
V_{GSS}	Gate-to-Source Voltage	± 30	
I_D	Continuous Drain Current	26	A
I_{DM}	Pulsed Drain Current at $V_{GS}=10V^{[1]}$	92	
E_{AS}	Single Pulse Avalanche Energy ^[2]	850	mJ
P_D	Power Dissipation	312	W
	Derating Factor above 25°C	2.5	W/ $^{\circ}\text{C}$
dv/dt	Drain Source voltage slope, $V_{DS} \leq 480V$	50	V/ns
dv/dt	Reverse diode dv/dt, $V_{DS} \leq 480V, I_{SD} < I_D$	50	V/ns
$T_J \& T_{STG}$	Operating and Storage Temperature Range	-55 to 150	$^{\circ}\text{C}$

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Max. Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.4	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	

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Electrical Characteristics

OFF Characteristics

 $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	650	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	2	μA	$V_{DS}=650V, V_{GS}=0V$
		--	--	100		$V_{DS}=520V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+20V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-20V, V_{DS}=0V$

ON Characteristics

 $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance ^[3]	--	0.12	0.13	Ω	$V_{GS}=10V, I_D=12A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	--	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	2244	--	pF	$V_{GS}=0V, V_{DS}=50V, f=1.0\text{MHz}$
C_{rss}	Reverse Transfer Capacitance	--	1.17	--		
C_{oss}	Output Capacitance	--	137	--		
Q_g	Total Gate Charge	--	47	--	nC	$V_{DD}=325V, I_D=14A, V_{GS}=0 \text{ to } 10V$
Q_{gs}	Gate-to-Source Charge	--	11.5	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	18	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	37	--	ns	$V_{DD}=325V, I_D=14A, V_{GS}=10V, R_g=2.35\Omega$
t_{rise}	Rise Time	--	35	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	88	--		
t_{fall}	Fall Time	--	27	--		

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Source-Drain Body Diode Characteristics

$T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current ^[2]	--	--	26	A	Maximum Ratings
I_{SM}	Pulsed Source Current ^[2]	--	--	92		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_S=24\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	170	--	ns	$I_F=14\text{A}$, $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	488	--	nC	

Note:

[1] Repetitive Rating: Pulse width limited by maximum junction temperature

[2] $V_{DD}=50\text{V}$, $V_G=10\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$ $L=10\text{mH}$

[3] Pulse Test: Pulse width $\leq 380\mu\text{s}$, Duty Cycle $\leq 2\%$

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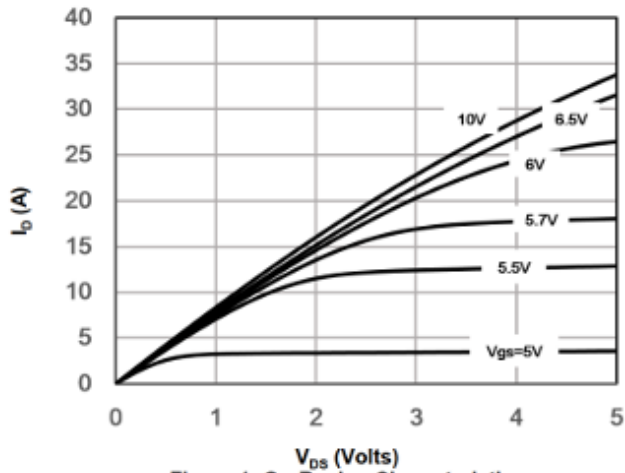


Figure 1: On-Region Characteristics

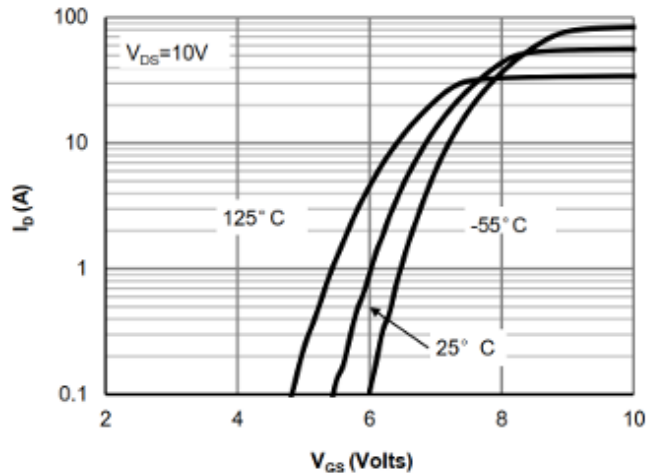


Figure 2: Transfer Characteristics

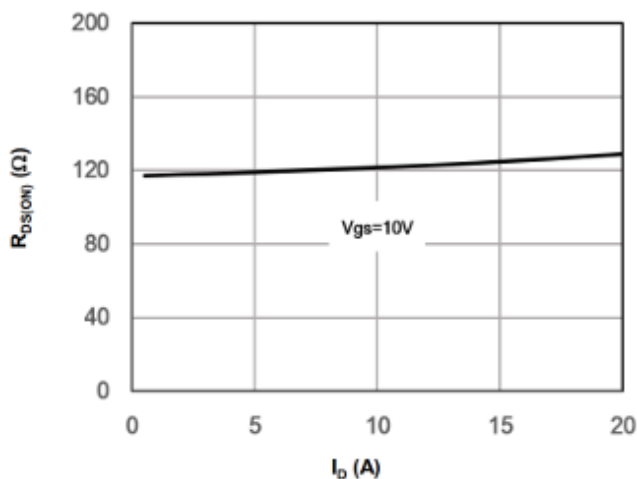


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

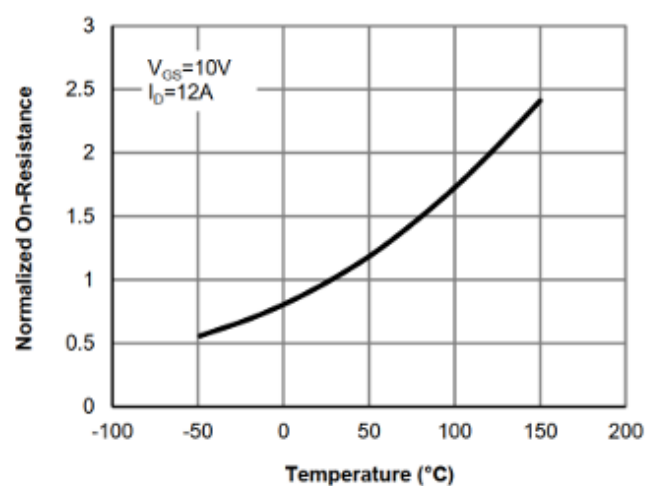


Figure 4: On-Resistance vs. Junction Temperature

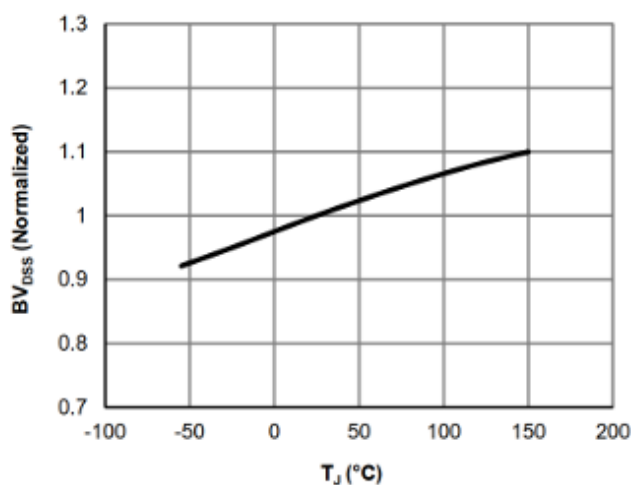


Figure 5: Break Down vs. Junction Temperature

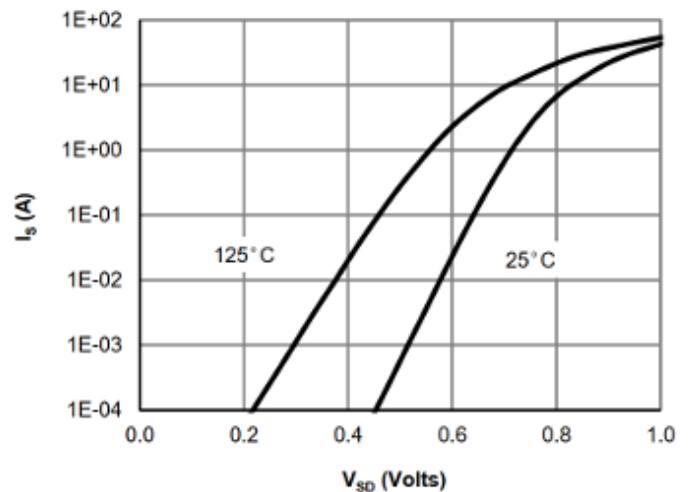


Figure 6: Body-Diode Characteristics

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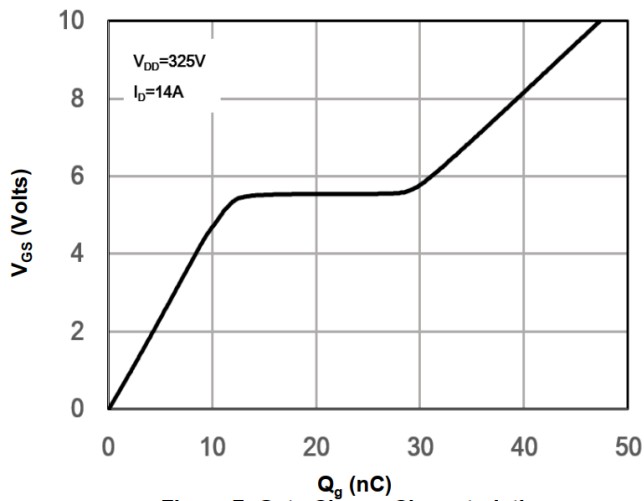


Figure 7: Gate-Charge Characteristics

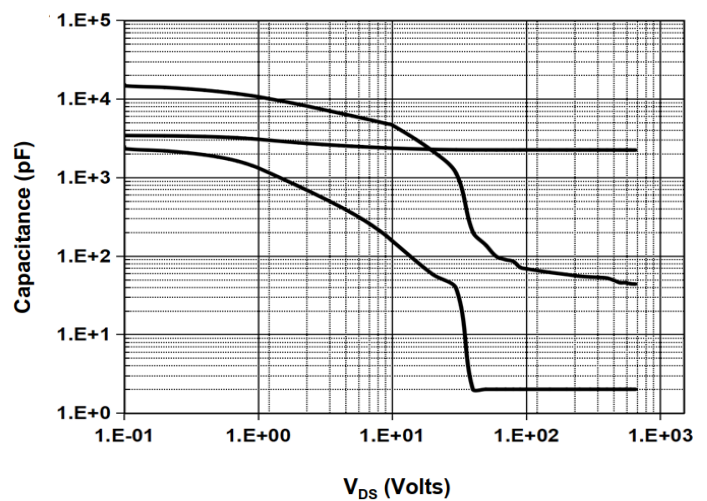


Figure 8: Capacitance Characteristics

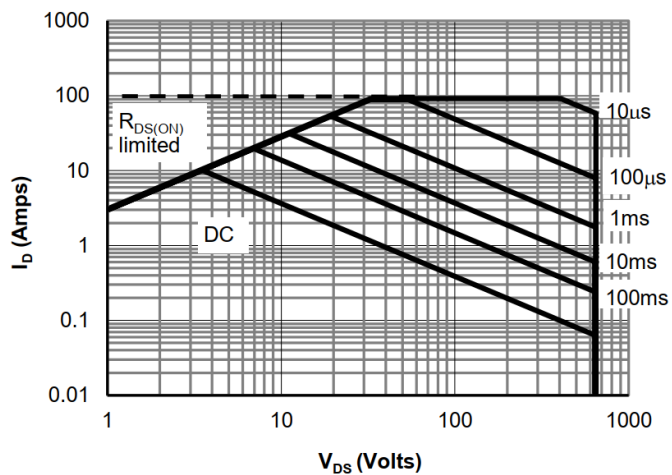


Figure 9: Maximum Forward Biased Safe Operating Area