

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
650V	360mΩ@10V	11.5A

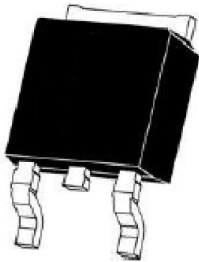
### Feature

- New technology for high voltage device
- Low on-resistance and low conduction losses
- Ultra Low Gate Charge cause lower driving requirements

### Application

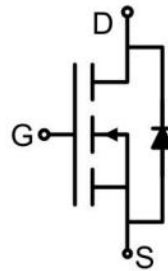
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

### Package

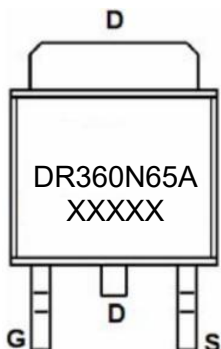


TO-252AB

### Circuit diagram



### Marking



### Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	650	V
Gate-Source Voltage, AC (f>1 Hz)	V <sub>GS</sub>	±30	V
Continuous Drain Current	I <sub>D</sub>	11.5	A
Continuous Drain Current(T <sub>C</sub> =100°C)	I <sub>D</sub> (100°C)	7	A
Pulsed Drain Current <sup>1)</sup>	I <sub>DM</sub>	46	A
Power Dissipation	P <sub>D</sub>	101	W
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	1.24	°C/W
Single pulse avalanche energy <sup>2)</sup>	E <sub>AS</sub>	144	mJ
Avalanche current <sup>1)</sup>	I <sub>AR</sub>	6	A
Repetitive avalanche energy, t <sub>AR</sub> limited by T <sub>Jmax</sub> <sup>1)</sup>	E <sub>AR</sub>	0.5	mJ
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°C

### Electrical characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	650			V
Zero gate voltage drain current(T <sub>C</sub> =25°C)	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> = 0V			1	μA
Zero gate voltage drain current(T <sub>C</sub> =125°C)	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> = 0V			100	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V			±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0	3.5	4.0	V
Drain-source on-resistance	R <sub>DSON</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =7A		290	360	mΩ
<b>Dynamic characteristics<sup>3)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f =1MHz		870		pF
Output Capacitance	C <sub>oss</sub>			54		
Reverse Transfer Capacitance	C <sub>rss</sub>			1.8		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =11.5A		19		nC
Gate-Source Charge	Q <sub>gs</sub>			6		
Gate-Drain Charge	Q <sub>gd</sub>			6.5		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =380V, V <sub>GS</sub> =10V, I <sub>D</sub> =5.8A, R <sub>G</sub> =3Ω		11		nS
Turn-on rise time	t <sub>r</sub>			8		
Turn-off delay time	t <sub>d(off)</sub>			58		
Turn-off fall time	t <sub>f</sub>			9		
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =11.5A, T <sub>J</sub> =25°C			1.2	V
Diode Forward Current	I <sub>SD</sub>	T <sub>C</sub> =25°C			11.5	A
Pulsed-Source-drain current	I <sub>SDM</sub>				46	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 5.8A di/dt = 100A/μs		220		nS
Reverse Recovery Charge	Q <sub>rr</sub>			2.2		uC
Peak reverse recovery current	I <sub>rrm</sub>			19		A

Notes:

- 1) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2) T<sub>J</sub> =25°C, V<sub>DD</sub> =50V, V<sub>G</sub> =10V, R<sub>G</sub> =25Ω.
- 3) Guaranteed by design, not subject to production.

## Typical Characteristics

Figure1. Safe operating area

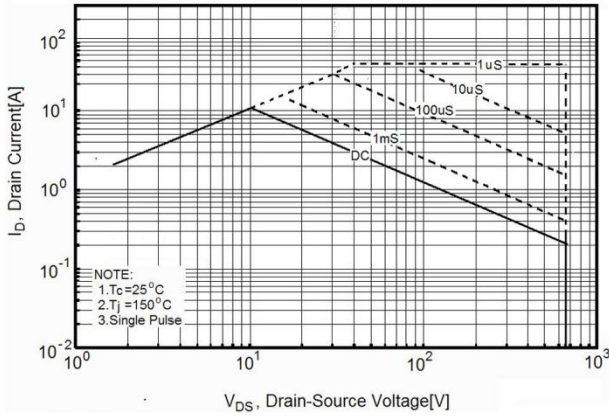


Figure2. Transient Thermal Impedance

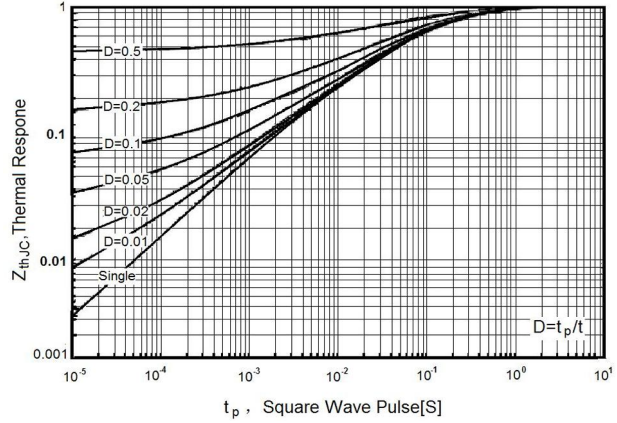


Figure3. Source-Drain Diode Forward Voltage

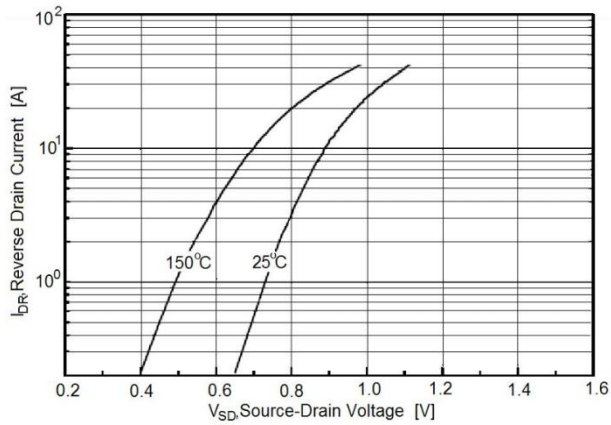


Figure4. Output characteristics

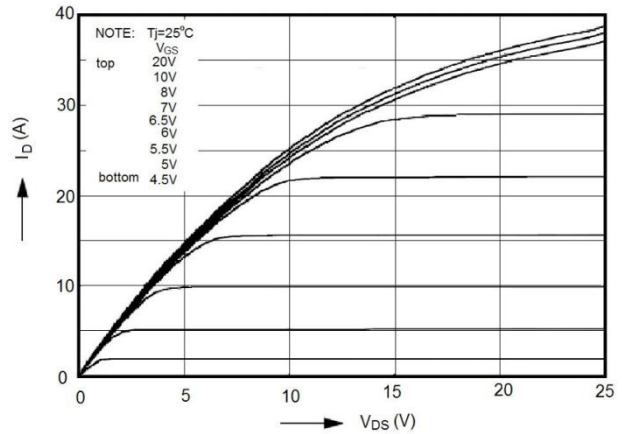


Figure5. Transfer characteristics

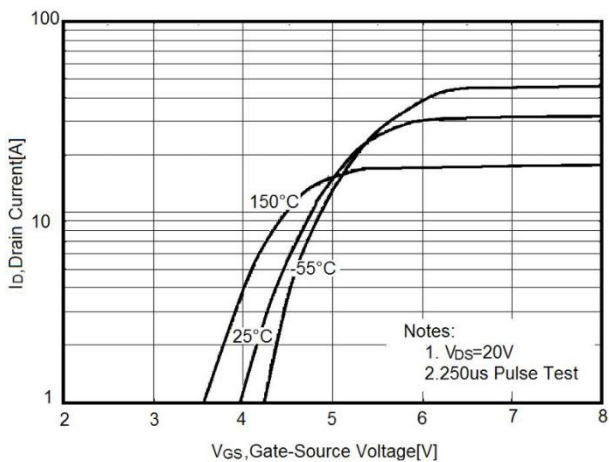
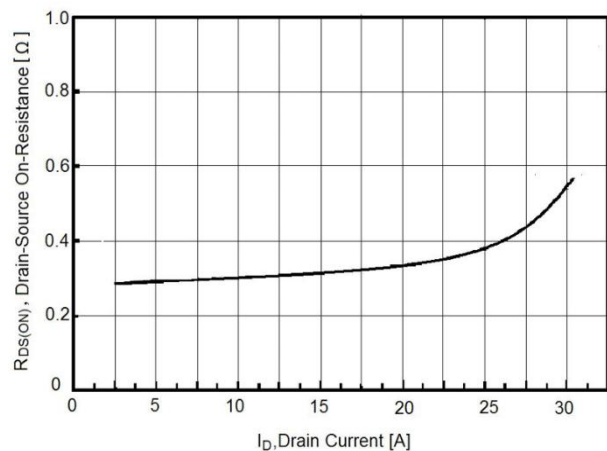
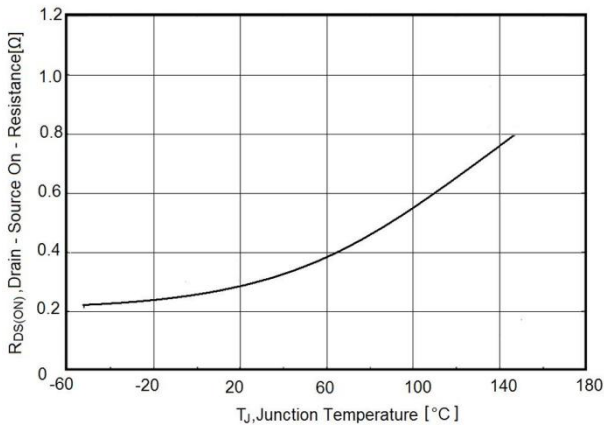


Figure6. Static drain-source on resistance

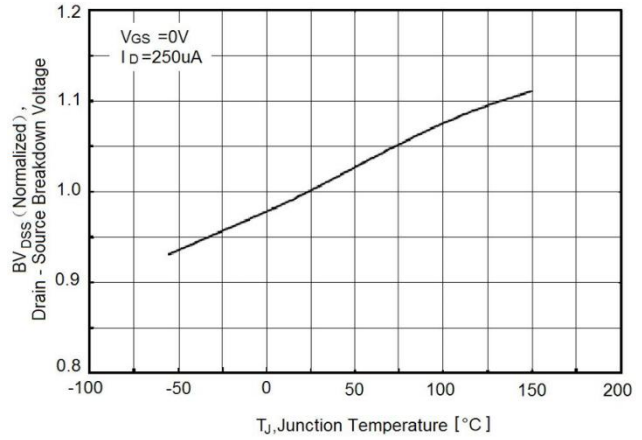


## Typical Characteristics

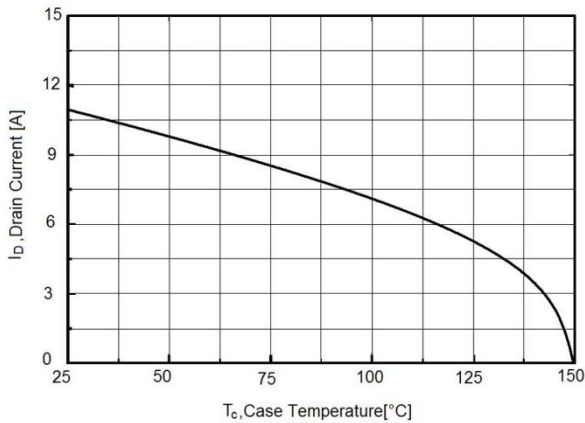
**Figure7.  $R_{DS(ON)}$  vs Junction Temperature**



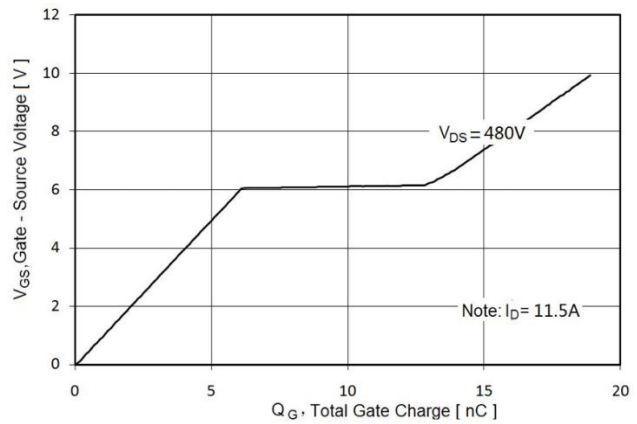
**Figure8.  $BV_{DSS}$  vs Junction Temperature**



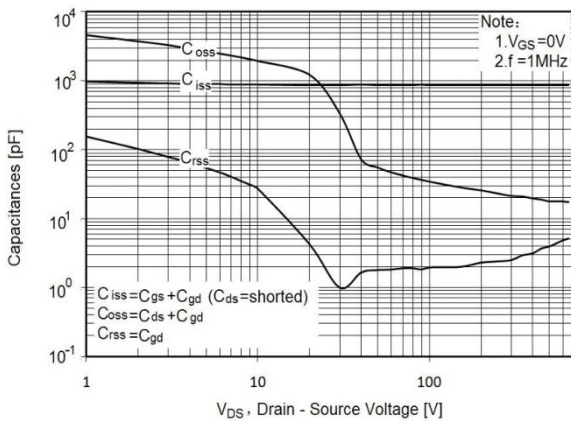
**Figure9. Maximum  $I_D$  vs Junction Temperature**



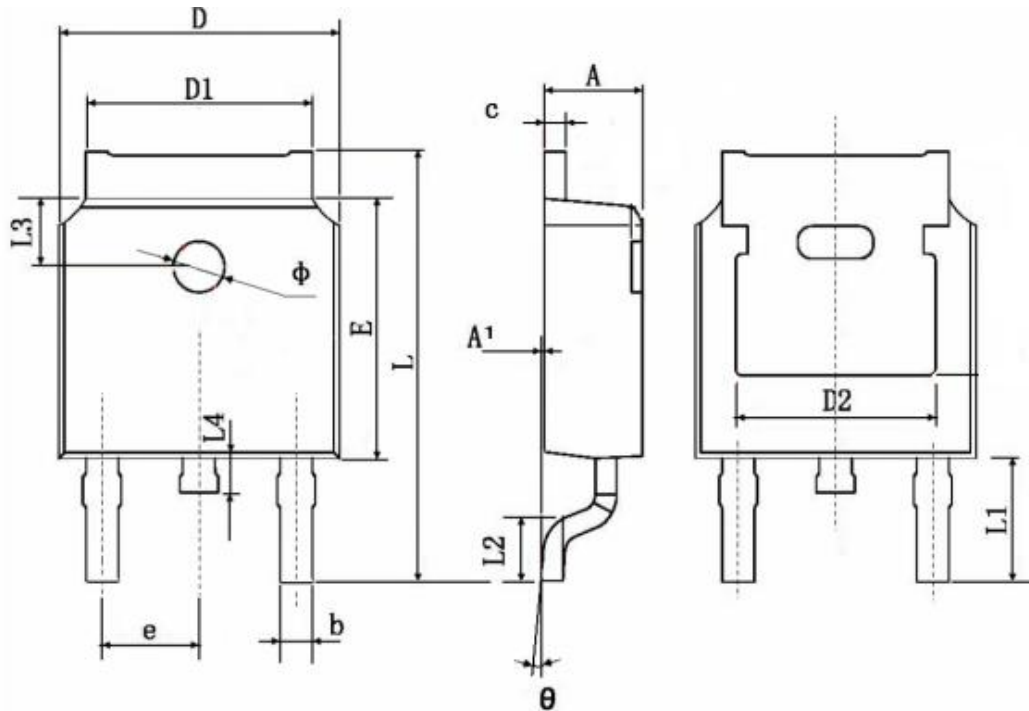
**Figure10. Gate charge waveforms**



**Figure11. Capacitance**



### TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.130	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.600	0.018	0.024
D	6.500	6.700	0.256	0.264
D1	5.100	5.500	0.201	0.217
D2	4.700	-	0.185	-
E	6.000	6.200	0.236	0.244
e	2.186	2.390	0.086	0.094
L	9.800	10.500	0.386	0.413
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.800	0.055	0.070
L3	1.800 REF.		0.071 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.400	0.043	0.055
θ	0°	8°	0°	8°