

## N-Channel 40 V (D-S) Super Junction MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ ) (TYP.)	$I_D$ (A) <sup>a,e</sup>	$Q_g$ (TYP.)
40	0.58 at $V_{GS} = 10$ V	245	98 nC

### FEATURES

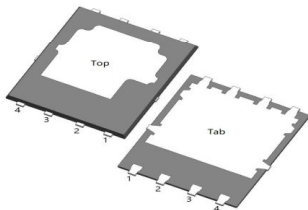
- DT-SJ Power MOSFET
- 100 %  $R_g$  and UIS Tested
- AEC-Q101 Qualified for Automotive Applications

### APPLICATIONS

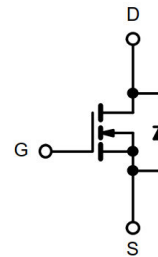
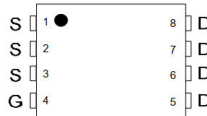
- Notebook PC Core
- VRM/POL


**RoHS**  
 COMPLIANT

DFN5\*6 Double Cooling



Top View



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	245 <sup>a,e</sup>
		$T_C = 70^\circ\text{C}$	218
		$T_A = 25^\circ\text{C}$	60 <sup>b, c</sup>
		$T_A = 70^\circ\text{C}$	40 <sup>b, c</sup>
Pulsed Drain Current	$I_{DM}$	920	
Avalanche Current Pulse	$L = 0.1$ mH $I_{AS}$	230	
Single Pulse Avalanche Energy		$E_{AS}$	956
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	245 <sup>a</sup>
		$T_A = 25^\circ\text{C}$	60 <sup>b, c</sup>
Maximum Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	376 <sup>a</sup>
		$T_C = 70^\circ\text{C}$	241
		$T_A = 25^\circ\text{C}$	56 <sup>b, c</sup>
		$T_A = 70^\circ\text{C}$	40 <sup>b, c</sup>
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	$^\circ\text{C}$

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, d</sup>	$t \leq 10$ s $R_{thJA}$	1.5	2.7	$^\circ\text{C/W}$
Maximum Junction-to-Case	Steady State $R_{thJC}$	0.25	0.39	

Notes:

 a. Based on  $T_C = 25^\circ\text{C}$ .

b. Surface mounted on 1" x 1" FR4 board.

 c.  $t = 10$  s.

d. Calculated based on maximum junction temperature.

e. Package limited.

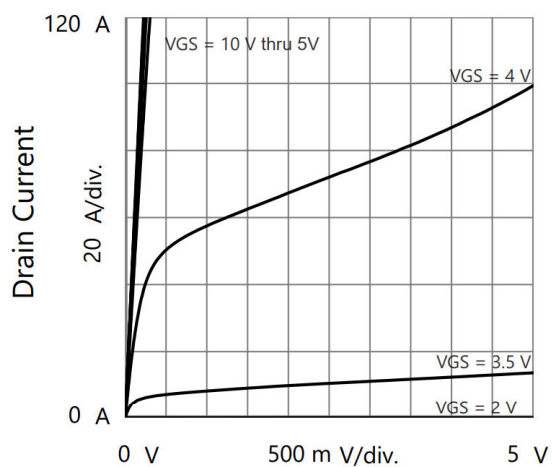
SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA		25		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			- 6.2		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.5		3.5	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	240			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A		0.58	0.69	mΩ
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 30 A		122		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, f = 1 MHz		6650		pF
Output Capacitance	C <sub>oss</sub>			2100		
Reverse Transfer Capacitance	C <sub>rss</sub>			185		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> =30 A		98		nC
Gate-Source Charge	Q <sub>gs</sub>			19		
Gate-Drain Charge	Q <sub>gd</sub>			13		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.5		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 0.555 Ω I <sub>D</sub> ≅ 30A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω		22		ns
Rise Time	t <sub>r</sub>			10		
Turn-Off Delay Time	t <sub>d(off)</sub>			62		
Fall Time	t <sub>f</sub>			10		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			245	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				920	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 1 A		0.6	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 30 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		26		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			88		nC
Reverse Recovery Fall Time	t <sub>a</sub>			26		ns
Reverse Recovery Rise Time	t <sub>b</sub>			23		

Notes:

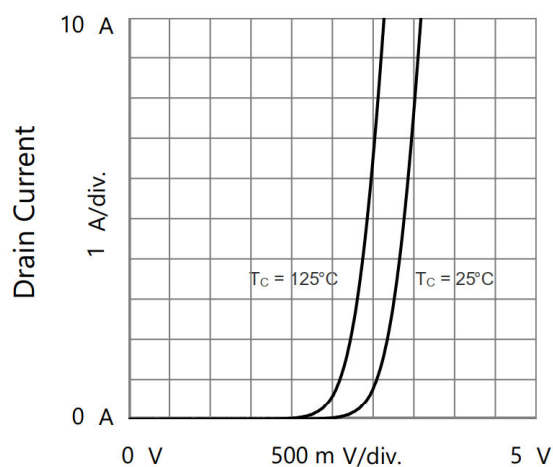
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

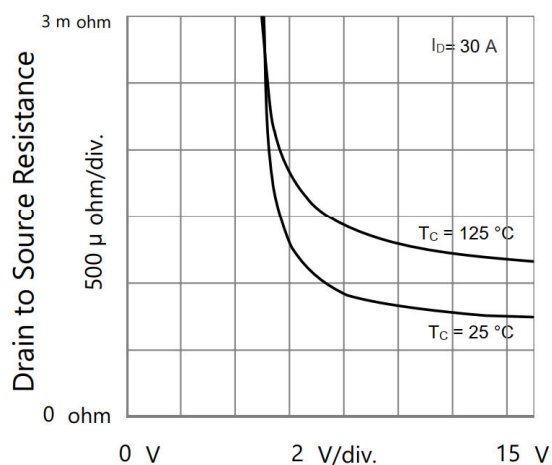
**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)



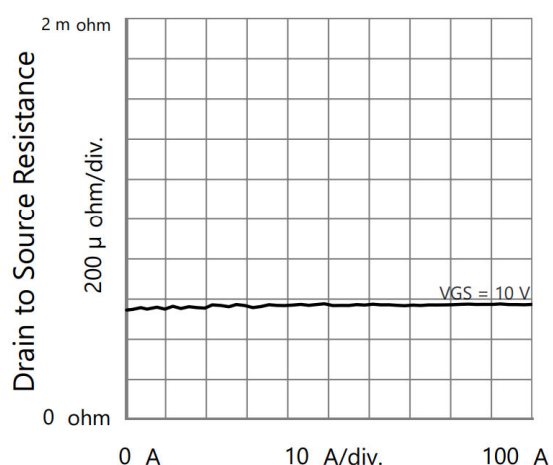
Drain to Source Voltage  
Output Characteristics



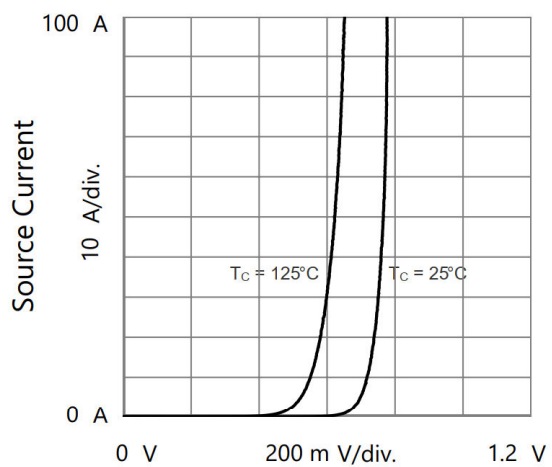
Gate to Source Voltage  
Transfer Characteristics



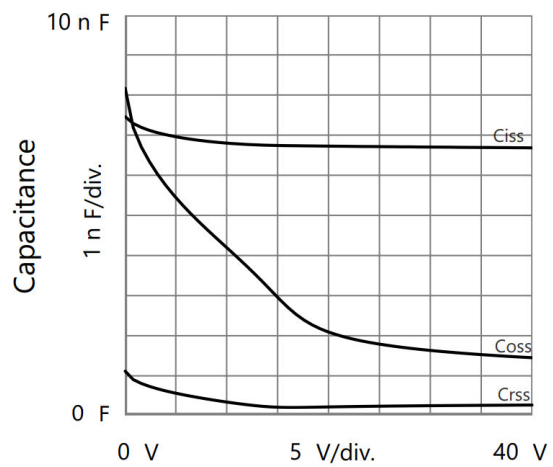
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

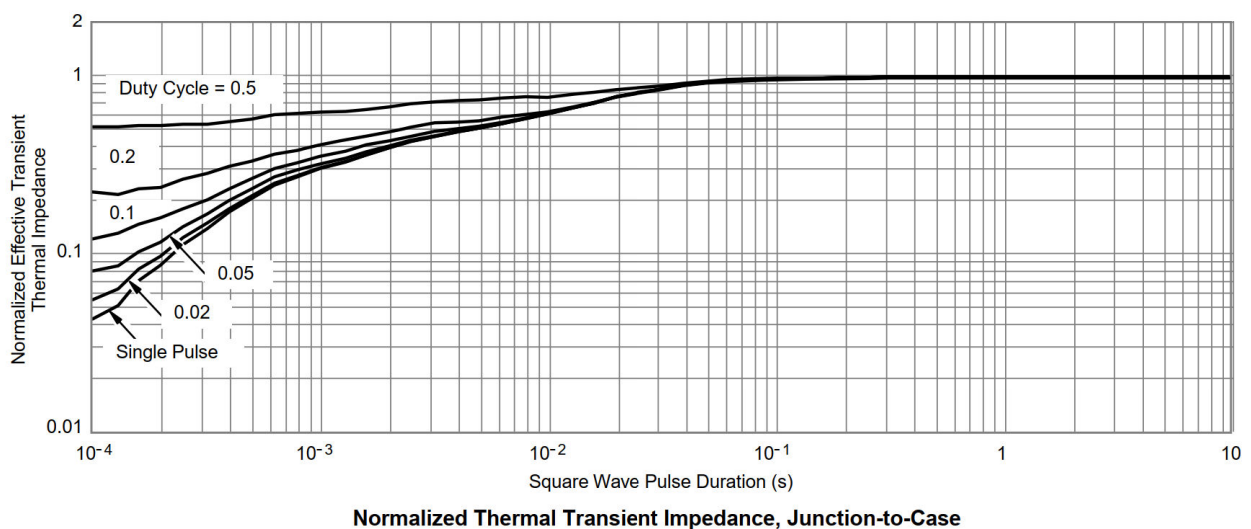
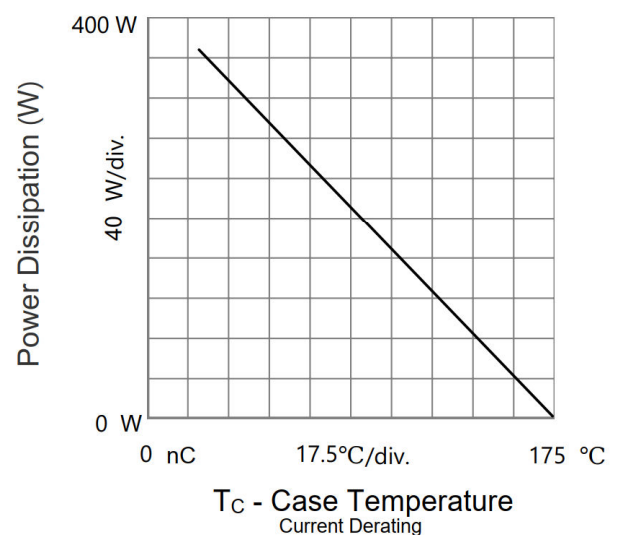
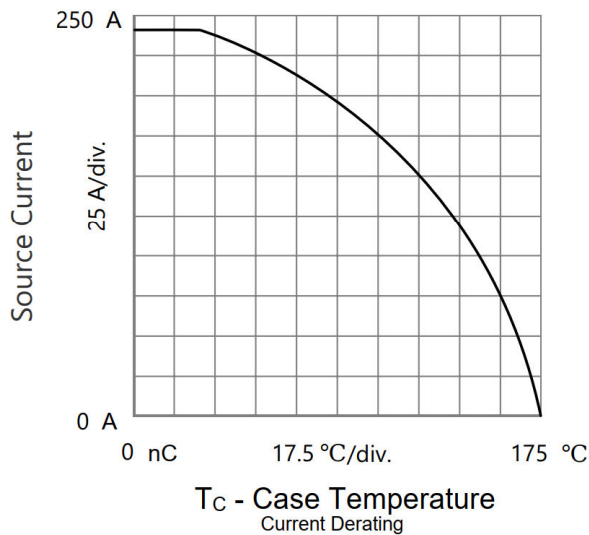
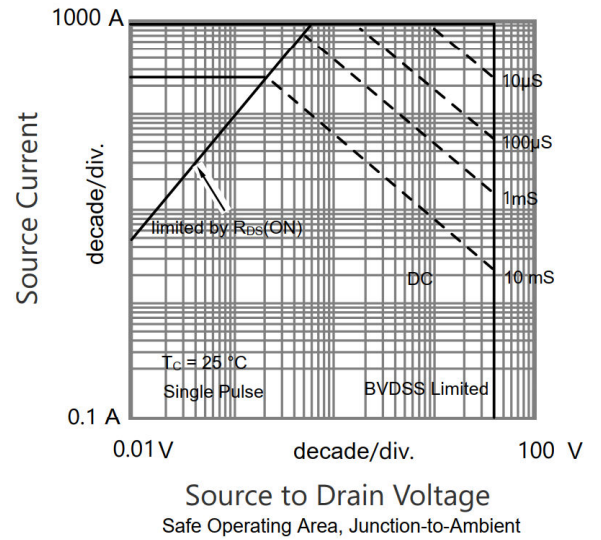
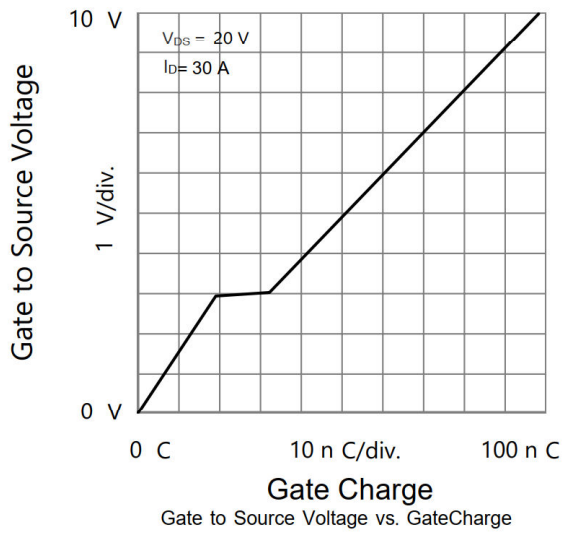


Source to Drain Voltage  
Body Diode Forward Characteristics



Drain to Source Voltage  
Capacitances

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)





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