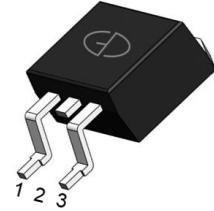


## N-Channel 40V (D-S) Power MOSFET

### Features

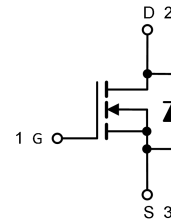
- 100% Avalanche Tested
- Extremely Low Losses with Low FOM  $R_{ds(on)} \cdot Q_g$
- Halogen Free, Pb-Free
- RoHS Compliant



TO-263AB (D<sup>2</sup>PAK)

### Applications

- DC/DC
- Motors, lamps
- Power switching



### Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain Source Voltage	$V_{DS}$	40	V
Gate Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current, Continuous $V_{GS}=10\text{V}$ (Note 1)	$I_D$	$T_C=25^\circ\text{C}$	200
		$T_C=100^\circ\text{C}$	135
Drain Current, Pulsed (Note 2)	$I_{DM}$	750	A
Single Avalanche Energy @ $L=0.3\text{mH}$	$E_{AS}$	912	mJ
Power Dissipation (Note 3)	$P_D$	220	W
Operating Junction/ Storage Temperature Range	$T_J / T_{STG}$	-55 to +150	$^\circ\text{C}$

Note 1: Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

Note 2: Repetitive rating; pulse width limited by max junction temperature.

### Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case (Note 3)	$R_{thJC}$	0.62	$^\circ\text{C/W}$
Junction-to-ambient ( $t \leq 10\text{s}$ ) (Note 4)	$R_{thJA}$	60	$^\circ\text{C/W}$
Junction-to-Ambient (PCB mounted, steady-state) (Note 4)		40	$^\circ\text{C/W}$

Note 3: The power dissipation  $P_D$  is based on max junction temperature, using junction-to-case thermal resistance.

Note 4: The value of  $R_{thJA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	--	--	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	--	--	1	uA
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA	2	--	4	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	--	--	±100	nA
Drain-Source On-state Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	--	2.4	3.5	mΩ
Total Gate Charge	Q <sub>g</sub>	I <sub>D</sub> = 75A, V <sub>DS</sub> 32V, V <sub>GS</sub> = 10V	--	104	--	nC
Gate Source Charge	Q <sub>gs</sub>		--	16	--	
Gate Drain Charge	Q <sub>gd</sub>		--	40	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =20V, R <sub>L</sub> =0.26Ω, R <sub>GEN</sub> =3Ω, I <sub>D</sub> =75A	--	21.4	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	57.8	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	48.7	--	
Turn-off Fall Time	t <sub>f</sub>		--	19.9	--	
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz	--	7615	--	pF
Output Capacitance	C <sub>oss</sub>		--	959	--	
Reverse Transfer Capacitance	C <sub>riss</sub>		--	342	--	

### Reverse Diode Characteristics (T<sub>J</sub> =25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Continuous Source Current (Body Diode)	I <sub>S</sub>	T <sub>C</sub> =25°C	--	--	200	A
Pulsed Source Current (Body Diode)	I <sub>SM</sub>		--	--	750	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V	--	0.86	1.3	V
Reverse Recovery Time	T <sub>rr</sub>	I <sub>F</sub> =50A, di/dt = 100 A/μs	--	29.6	--	ns
Reverse Recovery Charge	Q <sub>rr</sub>		--	22.2	--	nC

**Typical Characteristics Curves** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Fig.1 - Typical Output Characteristics

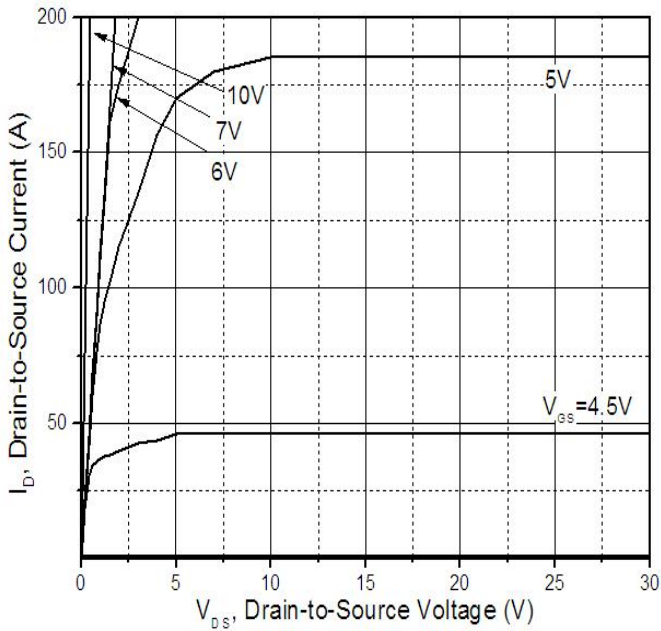


Fig.2 - Gate to source cut-off Voltage

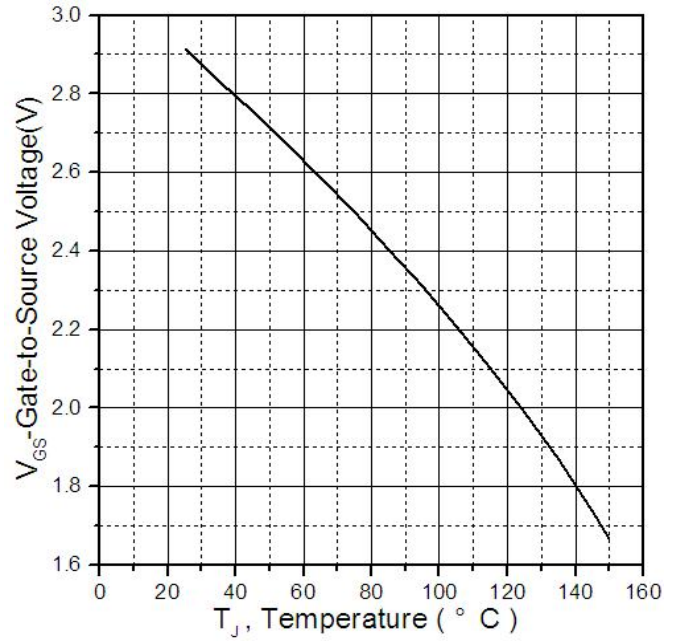


Fig.3 - Drain-to-Source Breakdown Voltage vs. Case Temperature

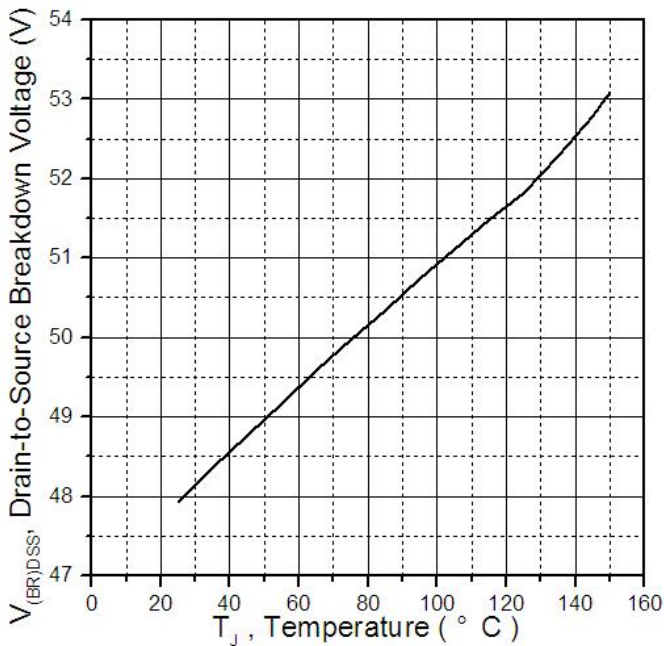


Fig.4 - Normalized On-Resistance vs. Case Temperature

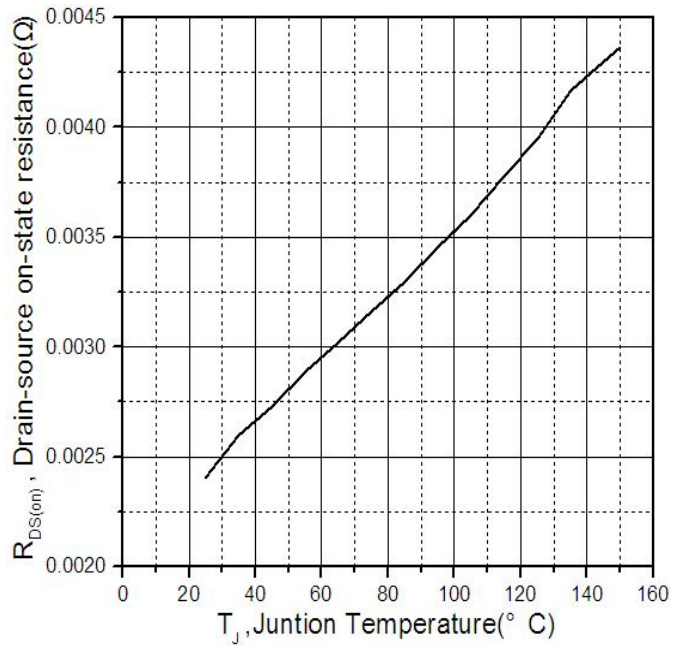


Fig.5 - Maximum Drain Current vs. Case Temperature

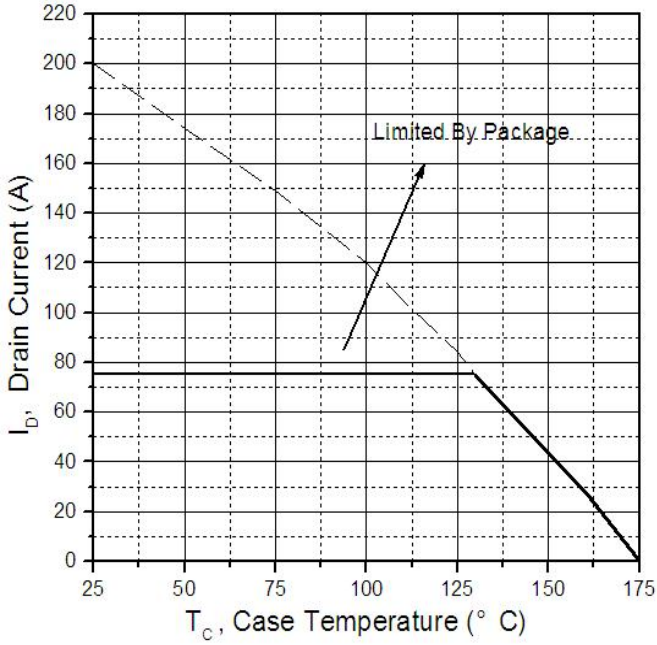


Fig.6 - Typical Capacitance vs. Drain-to-Source Voltage

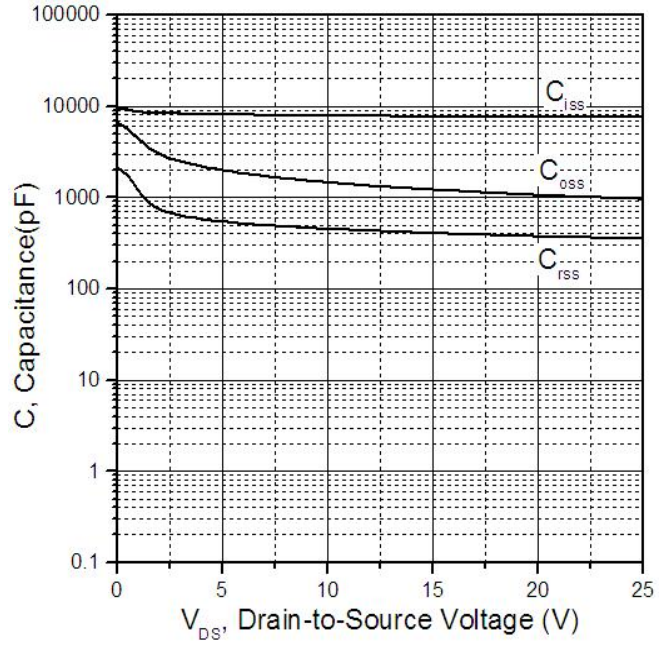
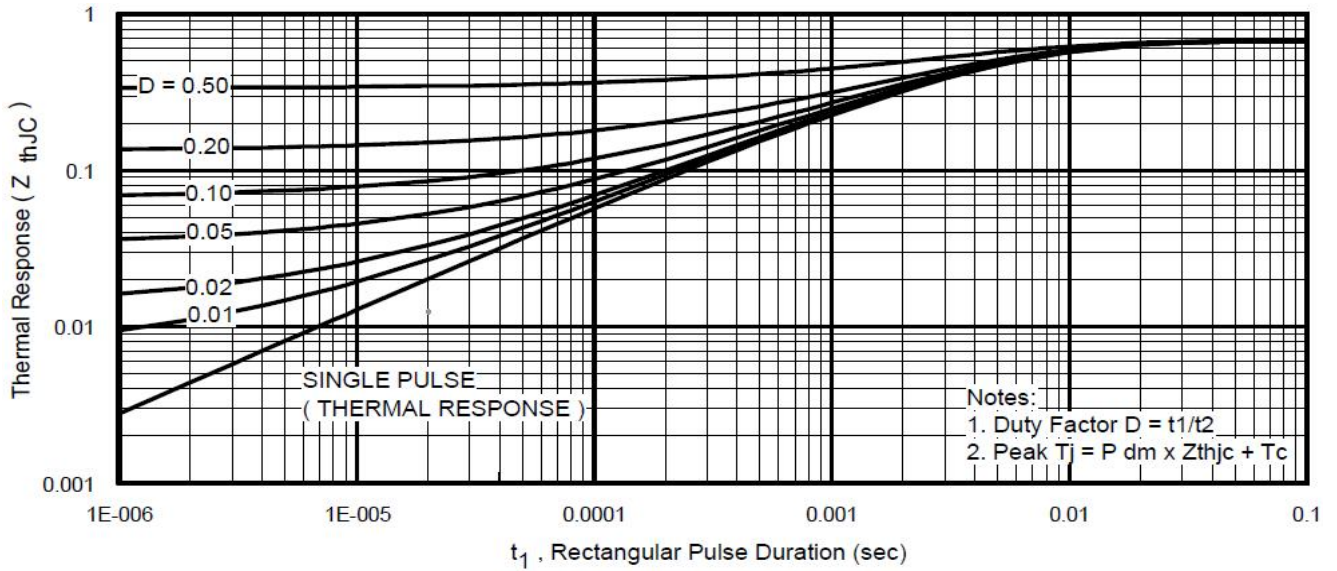
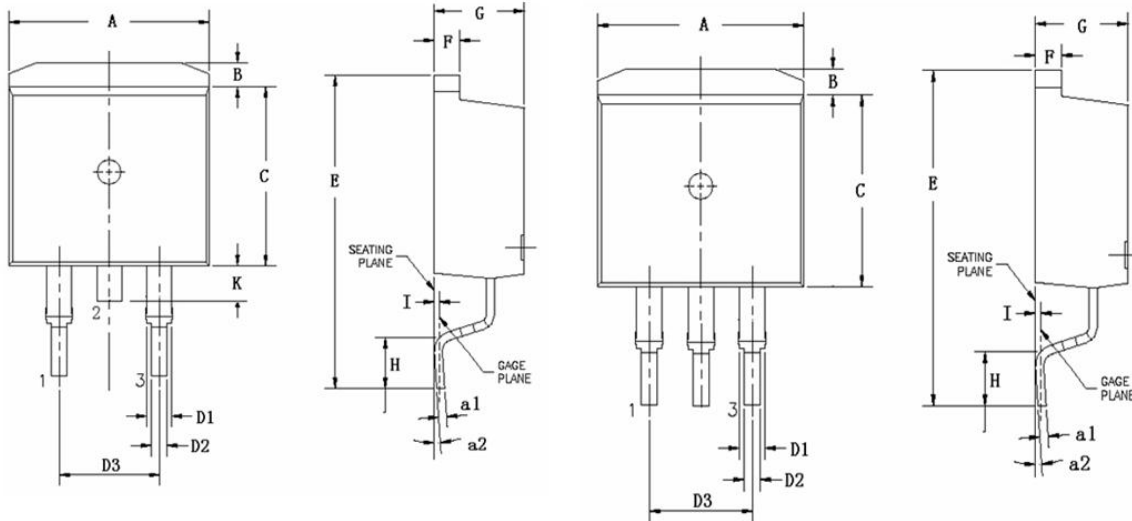


Fig.7 - Maximum Effective Transient Thermal Impedance, Junction-to-Case



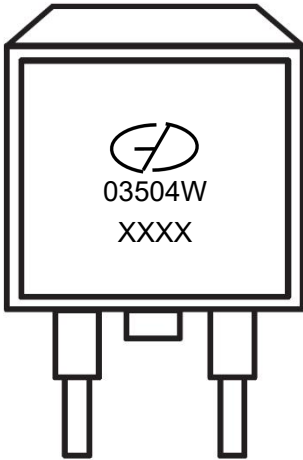
**Package Outline Dimensions** (Unit: millimeters)

**TO-263**



Symbol	Dimension In Millimeters		Dimension In Inches	
	Min	Max	Min	Max
A	9.660	10.280	0.380	0.405
B	1.020	1.320	0.040	0.052
C	8.590	9.400	0.338	0.370
D1	1.140	1.400	0.045	0.055
D2	0.700	0.950	0.028	0.037
D3	5.080 (TYP)		0.200 (TYP)	
E	15.090	15.390	0.594	0.606
F	1.150	1.400	0.045	0.055
G	4.300	4.700	0.169	0.185
H	2.290	2.790	0.090	0.110
I	0.250 (TYP)		0.010 (TYP)	
K	1.300	1.600	0.051	0.063
a1	0.450	0.650	0.018	0.026
a2	0°	8°	1°	8°

## Marking Outline



Part Name: GMN03504W

1. Logo Mark: 
2. P/N Mark: 03504W
3. Date Code: XXXX

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