



Applications

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness

Benefits

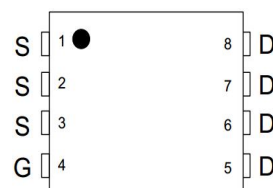
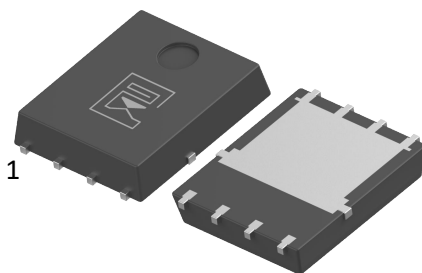
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Product Summary

V_{DS}	650	V
I_D	12	A
$R_{DS(ON)}, Typ@18V$	300	mΩ
Q_g	21	nC



DFN5x6



Gate: 4
Drain: 5-8
Source: 1-3

Package Marking and Ordering Information

Ordering code	Marking	Package	Packaging	Min. package quantity
MDG3C300R065	MDG3C300R065	DFN5x6	Tape & Reel	5000



» Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	- 10/+22	V
Recommended operational values	V_{GSop}	0/+18	V
Continuous Drain Current Tc=25°C V_{GS} =18V (Note 1)	I_D	12	A
Continuous Drain Current Tc=100°C V_{GS} =18V (Note 1)		9	A
Drain Current-Pulsed (Note 1)	I_{DM}	24	A
Total Dissipation	P_D	63	W
Junction Temperature	T_J	175	°C
Storage Temperature	T_{stg}	- 55~175	°C
Single Pulse Avalanche Energy (Note 2)	E_{AS}	20	mJ

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

» Thermal Characteristics

Parameter	Symbol	Max	Unit
Maximum Junction-to-Case	$R_{\theta JC}$	2.4	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	60	°C/W

Note 1: Ensure that the channel temperature does not exceed 175°C.

Note 2: V_{DD} =100V, Tch= 25°C(initial), L=0.5mH

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.

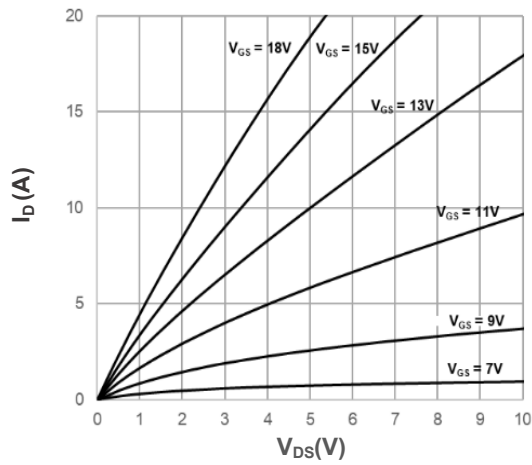


» Electrical Characteristics (Tc=25°C unless otherwise noted)

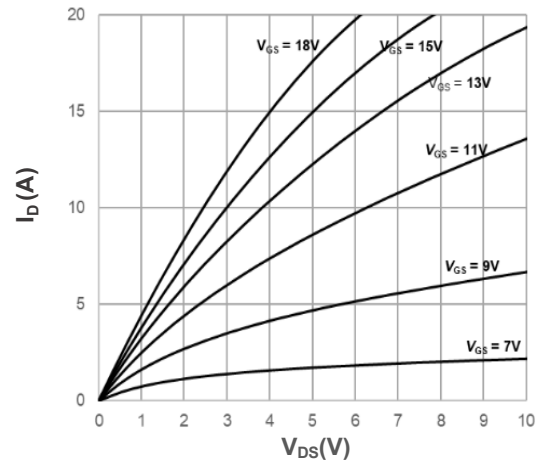
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =500uA	650	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	-	-	1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =18V, V _{DS} =0V	-	-	100	nA
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _{DS} =5mA	3.0	4.0	5.0	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =15V, I _D =6A	-	380	460	mΩ
		T _j =175℃	-	360	-	
		V _{GS} =18V, I _D =6A	-	300	360	
		T _j =175℃	-	340	-	
Transconductance	g _{fs}	V _{GS} =20V, I _D =6A	-	1.1		S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	-	266	-	pF
Output Capacitance	C _{oss}		-	69	-	pF
Reverse Transfer Capacitance	C _{rss}		-	5	-	pF
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1.0MHz	-	4.4	-	Ω
Switching Paramters						
Turn-On Delay Time	t _{d(on)}	V _{DD} =500V, V _{GS} =0/15 V I _D = 5A, R _{G(ext)} =10Ω	-	26	-	ns
Turn-On Rise Time	t _r		-	41	-	ns
Turn-Off Delay Time	t _{d(off)}		-	27	-	ns
Turn-Off Fall Time	t _f		-	71	-	ns
Turn-On Switching Energy	E _{ON}		-	38	-	uJ
Turn-Off Switching Energy	E _{OFF}		-	5.2	-	
Total Gate Charge	Q _g	V _{DD} =500V V _{GS} =0/15 V I _D =8.5A	-	21	-	nC
Gate-Source Charge	Q _{gs}		-	7	-	nC
Gate-Drain Charge	Q _{gd}		-	12	-	nC
Source-Drain Characteristics						
Diode Forward Voltage	V _{sd}	V _{GS} =0V, I _{SD} = 3 A,	-	3.5	-	V
Continuous Diode Forward Current	I _s	T _C =25℃	-	12	-	A
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =10A, di/dt=100A/us	-	21	-	ns
Reverse Recovery Charge	Q _{rr}		-	16	-	nC
Peak Reverse Recovey Current	I _{rrm}		-	1.5	-	A



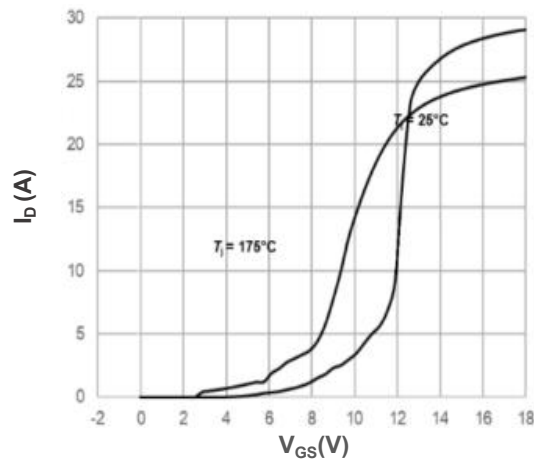
Characteristics Curves



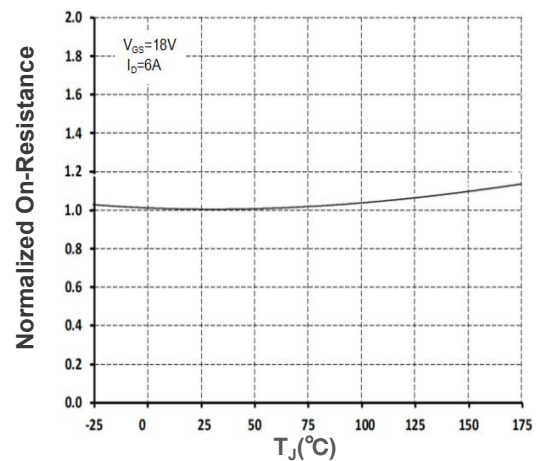
Output Characterisitics $T_J = 25^\circ\text{C}$



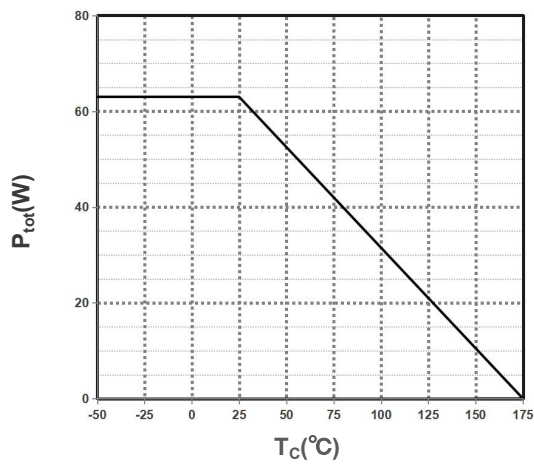
Output Characterisitics $T_J = 175^\circ\text{C}$



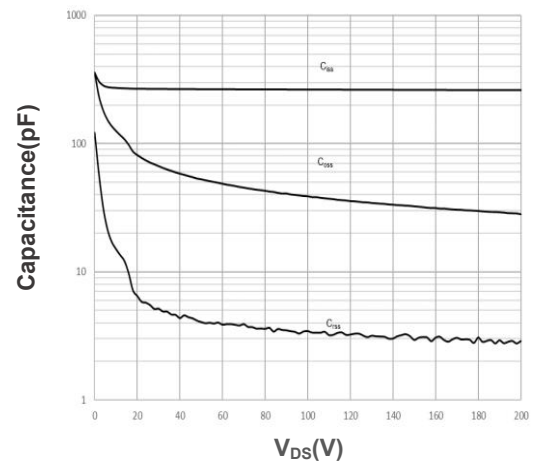
Transfer Characterisitics



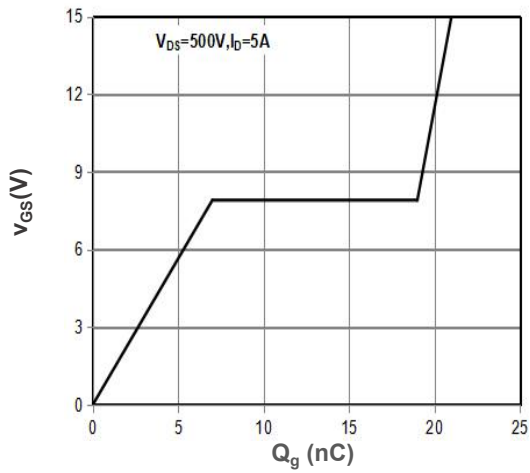
Normalized On-Resistance vs. Temperature



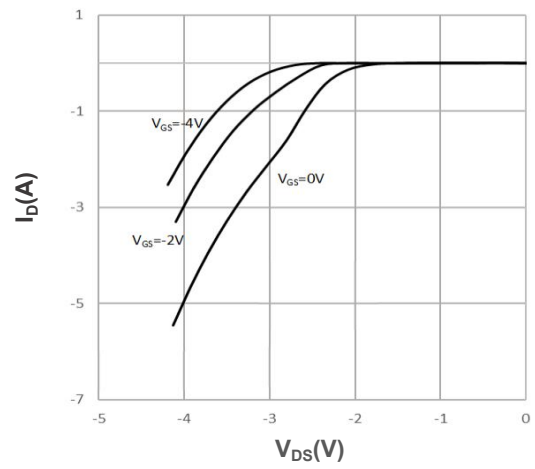
Power Dissipation Derating



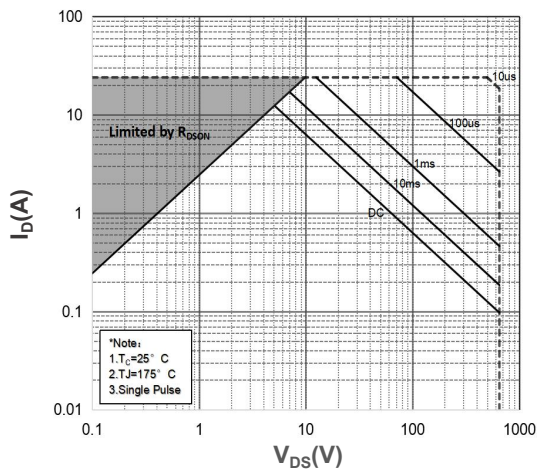
Capacitance



Gate Charge Waveform



Source-Drain Diode Characteristics, $T_J=25^\circ C$



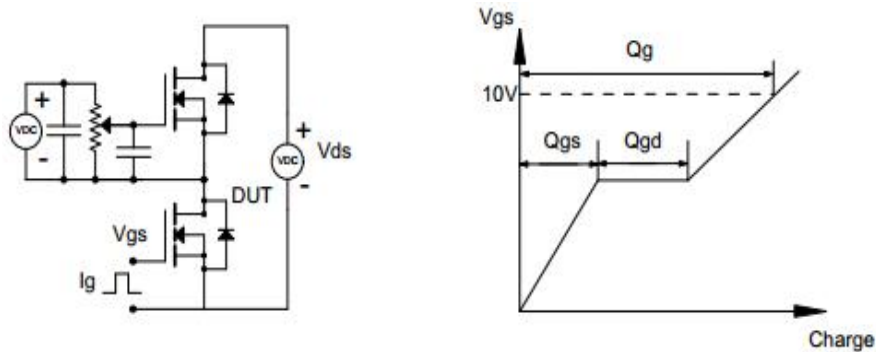
Safe Operating Area

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

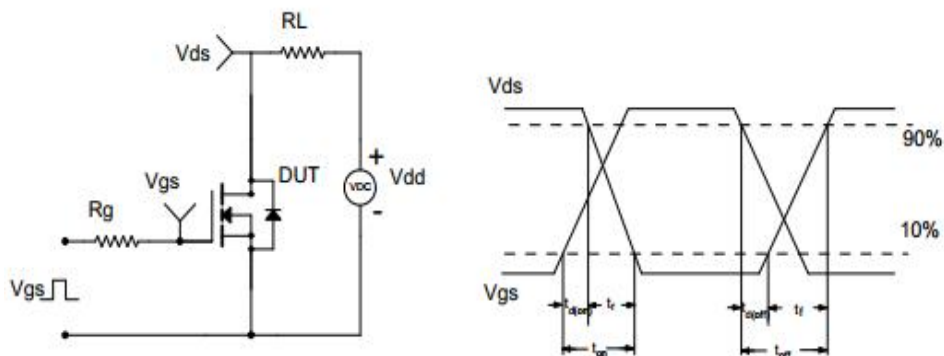


Test Circuit & Waveform

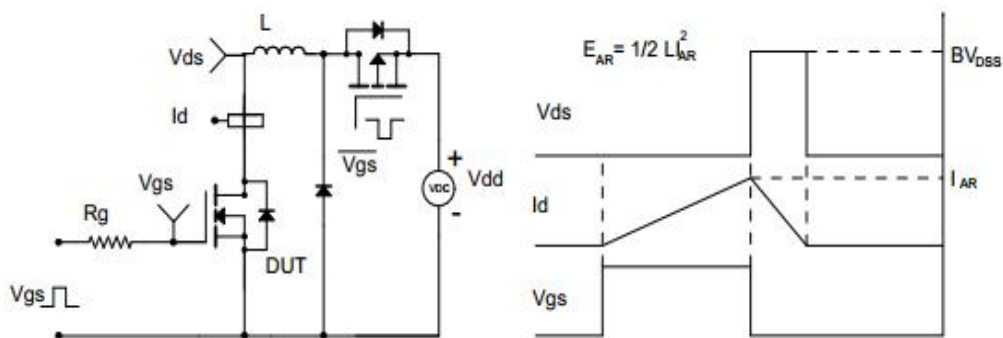
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform





» DFN5x6 Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	0.90		1.10	k	1.15		1.35
A3	0.15		0.30	b	0.20		0.40
D	4.90		5.10	e	1.15		1.35
D1	3.90		4.10	L	0.50		0.65
D2	4.75		5.05	L1	0.43		0.55
E	5.85		6.15	H	0.55		0.68
E1	3.35		3.55	θ	8°		12°
E2	5.55		5.85				

