100V 3.3mΩ N-Ch Power MOSFET

Features

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- 100% UIS Tested, 100% Rg Tested

Product Summary

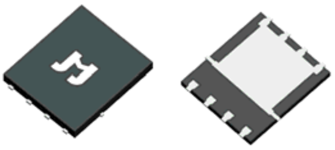
Parameter	Typ.	Unit
V_{DS}	100	V
$V_{GS(th)}$	2.7	V
I_D (@ V_{GS} = 10V) (1)	112	A
$R_{DS(ON)}$ (@ V_{GS} = 10V)	3.3	mΩ

Applications

- Power Managerment in Telecom., Industrial Automation, CE
- Current Switching in DC/DC & AC/DC Sub-systems
- Motor Driving in Power Tool, E-vehicle, Robotics

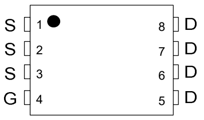
PDFN5x6

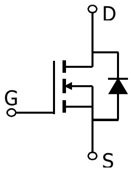
Top View Bottom View



Pin Configuration

Top View





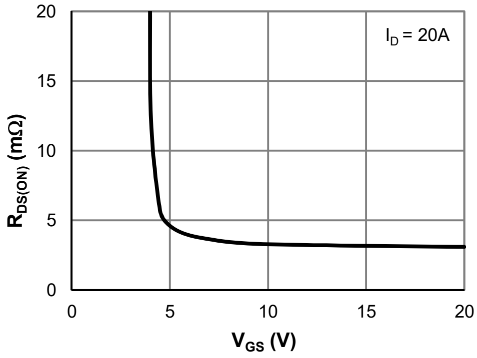
Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSH1004BG-13	PDFN5x6	8	SH1004B	1	-55 to 150	13-inch Reel	3000

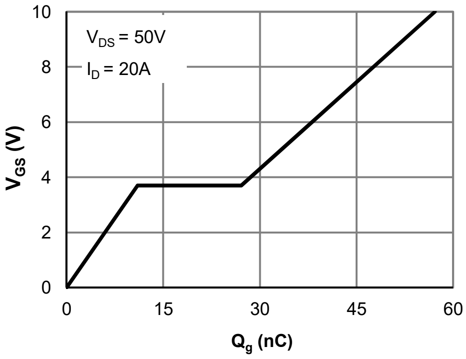
Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	100	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	112	A
	T_C = 100°C		71	
Continuous Drain Current (6)	T_C = 25°C	I_D	100	A
Pulsed Drain Current (2)		I_{DM}	403	A
Avalanche Current (3)		I_{AS}	68	A
Avalanche Energy (3)		E_{AS}	231	mJ
Power Dissipation (4)	T_C = 25°C	P_D	104	W
	T_C = 100°C		42	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

$R_{DS(ON)}$ vs. V_{GS}



Gate Charge



Electrical Characteristics (@ T_J = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu A$, $V_{GS} = 0V$	100			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 80V$, $V_{GS} = 0V$			1.0	µA
		$T_J = 55°C$			5.0	
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0V$, $V_{GS} = \pm 20V$			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	2.0	2.7	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10V$, $I_D = 20A$		3.3	4.3	mΩ
Forward Transconductance	g_{FS}	$V_{DS} = 5V$, $I_D = 20A$		100		S
Diode Forward Voltage	V_{SD}	$I_S = 1A$, $V_{GS} = 0V$		0.70	1.0	V
Diode Continuous Current	I_S	$T_C = 25°C$			104	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}	$V_{GS} = 0V$, $V_{DS} = 50V$, f = 1MHz		3434		pF
Output Capacitance	C_{oss}			906		pF
Reverse Transfer Capacitance	C_{rss}			14.0		pF
Gate Resistance	R_g	$V_{GS} = 0V$, $V_{DS} = 0V$, f = 1MHz		2.3		Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V $V_{DS} = 50V$, $I_D = 20A$		57		nC
Total Gate Charge (@V_{GS} = 6V)	Q_g			38		nC
Gate Source Charge	Q_{gs}			11.0		nC
Gate Drain Charge	Q_{gd}			16.1		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10V$, $V_{DS} = 50V$ $R_L = 2.5\Omega$, $R_{GEN} = 3\Omega$		14.1		ns
Turn-On Rise Time	t_r			34		ns
Turn-Off DelayTime	$t_{D(off)}$			60		ns
Turn-Off Fall Time	t_f			50		ns
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20A$, $dI_F/dt = 100A/\mu s$		78		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 20A$, $dI_F/dt = 100A/\mu s$		180		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	65	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.9	1.2	°C/W

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under T_{J_Max} = 150°C.
3. This single-pulse measurement was taken under the following condition [L = 100µH, V_{GS} = 10V, V_{DS} = 50V] while its value is limited by T_{J_Max} = 150°C.
4. The power dissipation P_D is based on T_{J_Max} = 150°C.
5. This value is guaranteed by design hence it is not included in the production test.
6. Continuous current rating is limited by the package used.

Typical Electrical & Thermal Characteristics

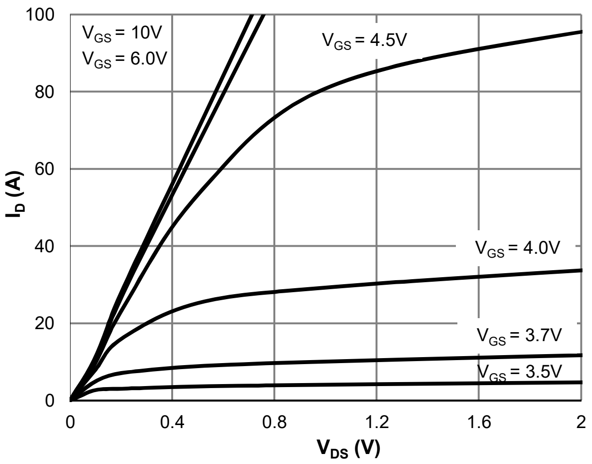


Figure 1: Saturation Characteristics

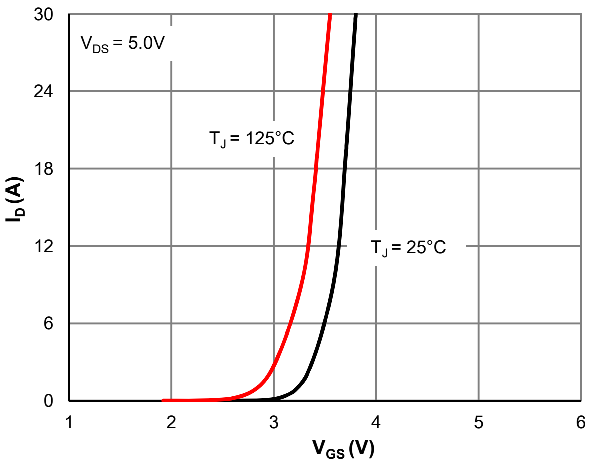


Figure 2: Transfer Characteristics

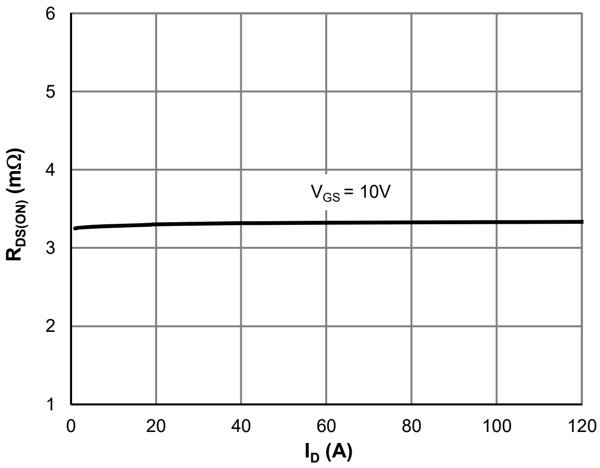


Figure 3: $R_{DS(ON)}$ vs. Drain Current

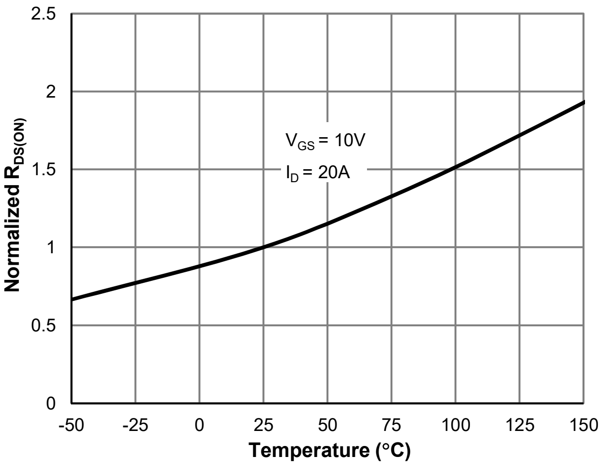


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

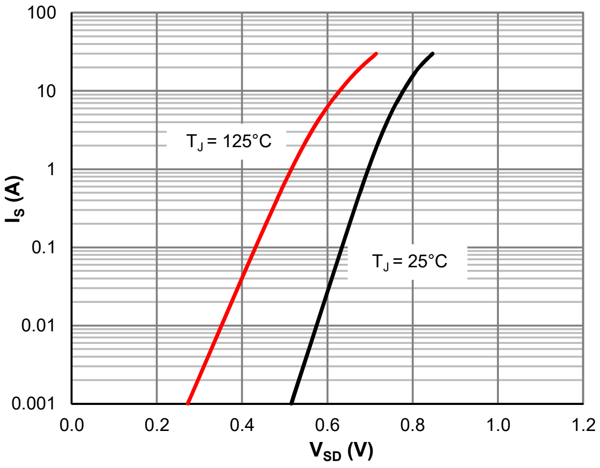


Figure 5: Body-Diode Characteristics

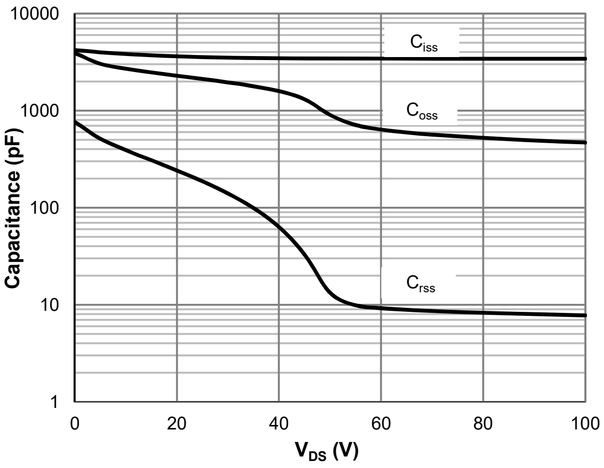


Figure 6: Capacitance Characteristics

Typical Electrical & Thermal Characteristics

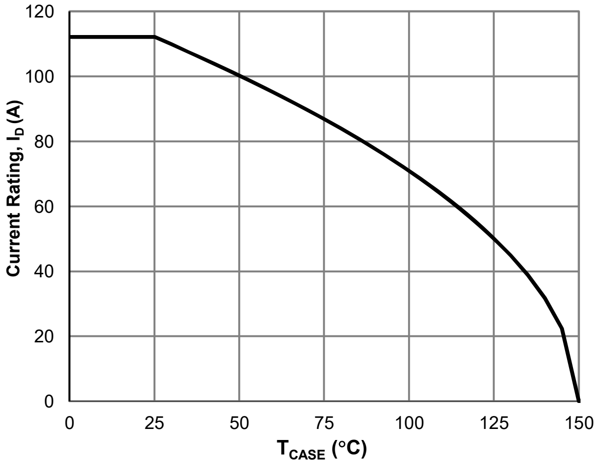


Figure 7: Current De-rating

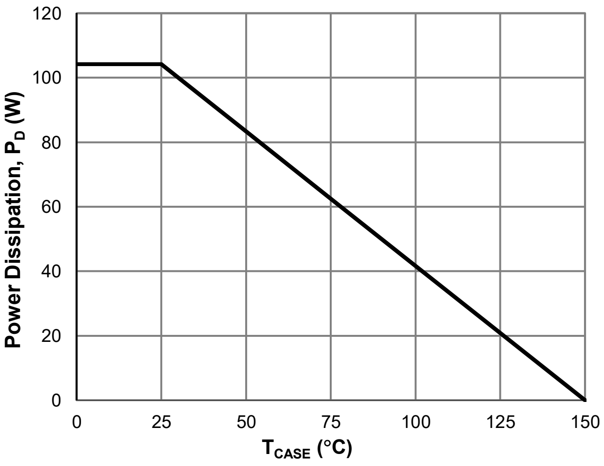


Figure 8: Power De-rating

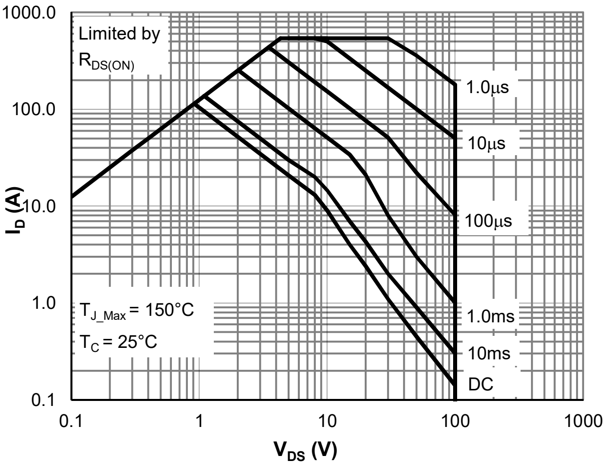


Figure 9: Maximum Safe Operating

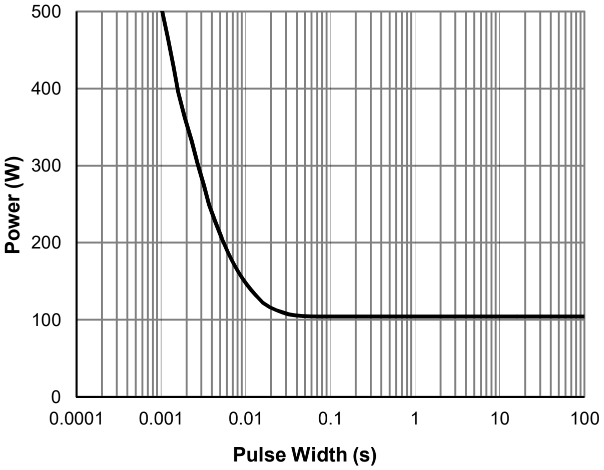


Figure 10: Single Pulse Power Rating, Junction-to-Case

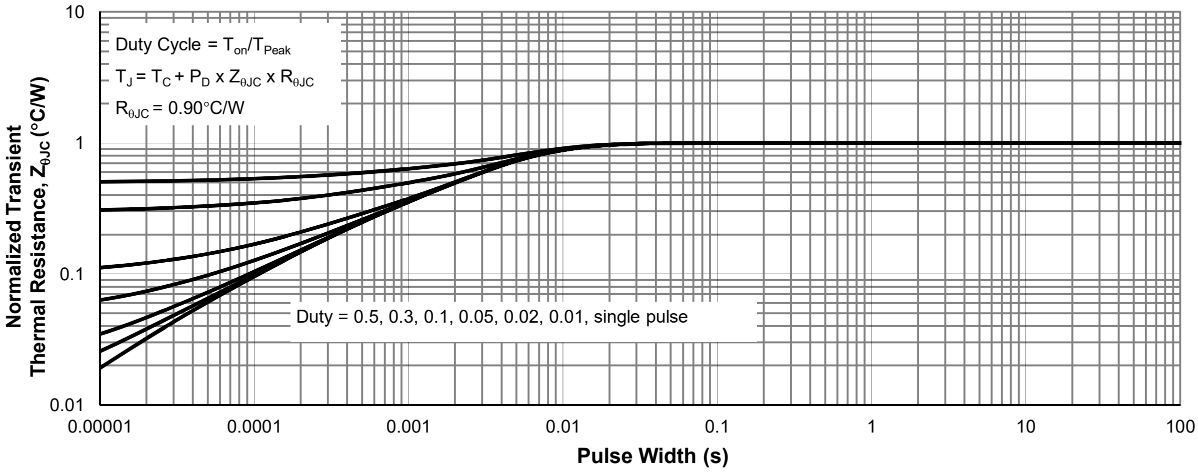
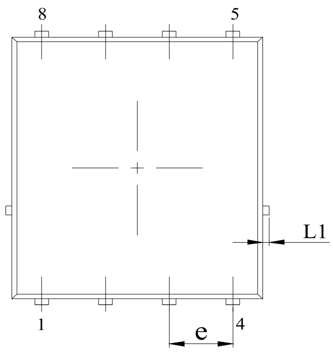


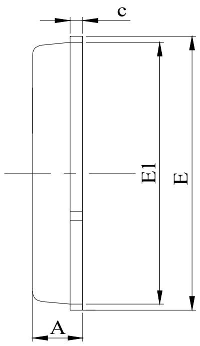
Figure 11: Normalized Maximum Transient Thermal Impedance

PDFN5x6 Package Information

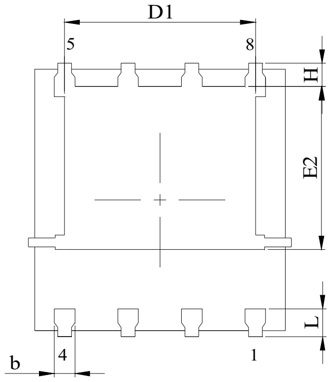
Package Outline



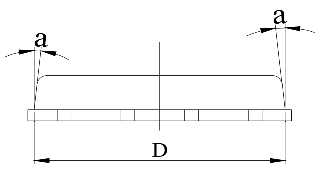
Top View



Side View



Bottom View



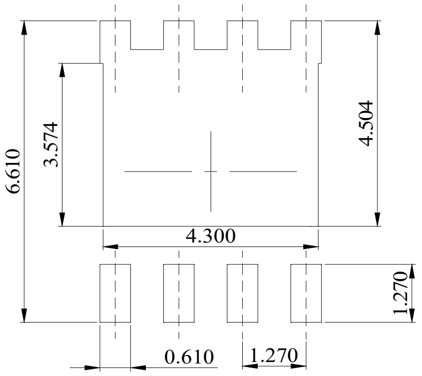
Front View

NOTES:

1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter (angle in degree).
3. Dimensions D and E1 do not include mold flash protrusions or gate burrs.

DIM.	MILLIMETER	
	MIN.	MAX.
A	0.90	1.20
b	0.33	0.51
c	0.23	0.33
D	4.80	5.40
D1	3.61	4.25
E	5.90	6.30
E1	5.55	5.95
E2	3.35	3.95
e	1.27 BSC	
H	0.41	0.80
L	0.51	0.80
L1	-	0.15
a	0°	12°

Recommended Footprint



DIMENSIONS: MILLIMETERS