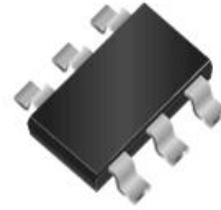
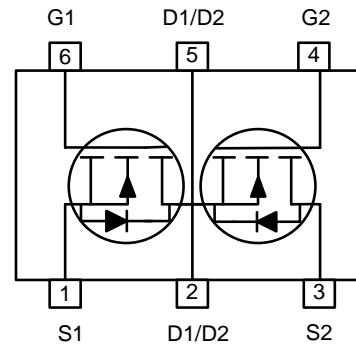


**WNMD2167**
**Dual N-Channel, 20V, 6.3A, Power MOSFET**
[Http://www.willsemi.com](http://www.willsemi.com)

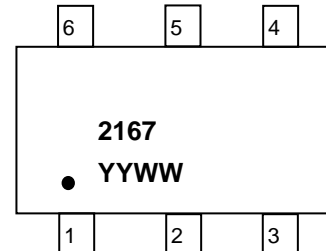
$V_{DS}$ (V)	Typical $R_{ds(on)}$ ( $\Omega$ )
20	0.016 @ $V_{GS}=4.5V$
	0.0175 @ $V_{GS}=3.8V$
	0.018 @ $V_{GS}=3.1V$
	0.020 @ $V_{GS}=2.5V$


**SOT-23-6L**
**Descriptions**

The WNMD2167 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNMD2167 is Pb-free.


**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package SOT-23-6L

**Pin configuration (Top view)**


2167 = Device Code  
 YY = Year  
 WW = Week

**Applications**

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

**Marking**
**Order information**

Device	Package	Shipping
WNMD2167-6/TR	SOT-23-6L	3000/Reel&Tape

**Absolute Maximum ratings**

Parameter	Symbol	10 S	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	20		V	
Gate-Source Voltage	$V_{GS}$	$\pm 10$			
Continuous Drain Current <sup>a d</sup>	$I_D$	$T_A=25^{\circ}C$	6.3	5.7	A
		$T_A=70^{\circ}C$	5.0	4.6	
Maximum Power Dissipation <sup>a d</sup>	$P_D$	$T_A=25^{\circ}C$	1.1	0.9	W
		$T_A=70^{\circ}C$	0.7	0.6	
Continuous Drain Current <sup>b</sup>	$I_D$	$T_A=25^{\circ}C$	5.8	5.2	A
		$T_A=70^{\circ}C$	4.6	4.1	
Maximum Power Dissipation <sup>b</sup>	$P_D$	$T_A=25^{\circ}C$	0.9	0.7	W
		$T_A=70^{\circ}C$	0.6	0.5	
Pulsed Drain Current <sup>c</sup>	$I_{DM}$	30		A	
Operating Junction Temperature	$T_J$	-55 to 150		$^{\circ}C$	
Lead Temperature	$T_L$	260		$^{\circ}C$	
Storage Temperature Range	$T_{stg}$	-55 to 150		$^{\circ}C$	

**Thermal resistance ratings**

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10$ s	$R_{\theta JA}$	76	94	$^{\circ}C/W$
	Steady State		115	145	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10$ s	$R_{\theta JA}$	92	115	
	Steady State		135	175	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	63	78	
Dual Operation					
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10$ s	$R_{\theta JA}$	79	97	$^{\circ}C/W$
	Steady State		118	148	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10$ s	$R_{\theta JA}$	96	118	
	Steady State		138	180	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	66	81	

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

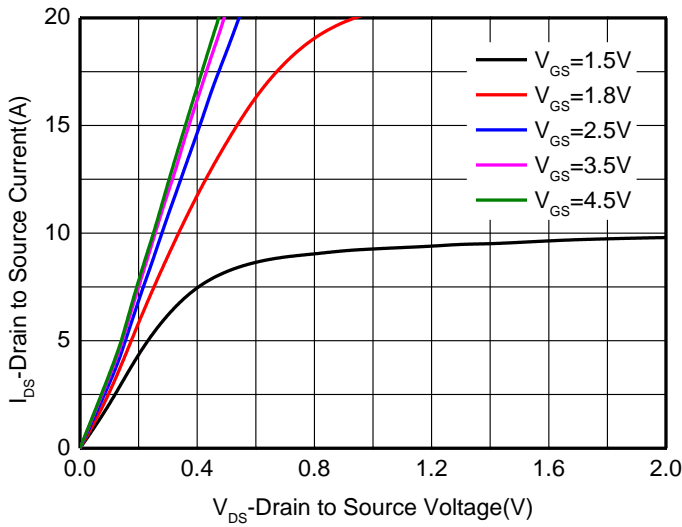
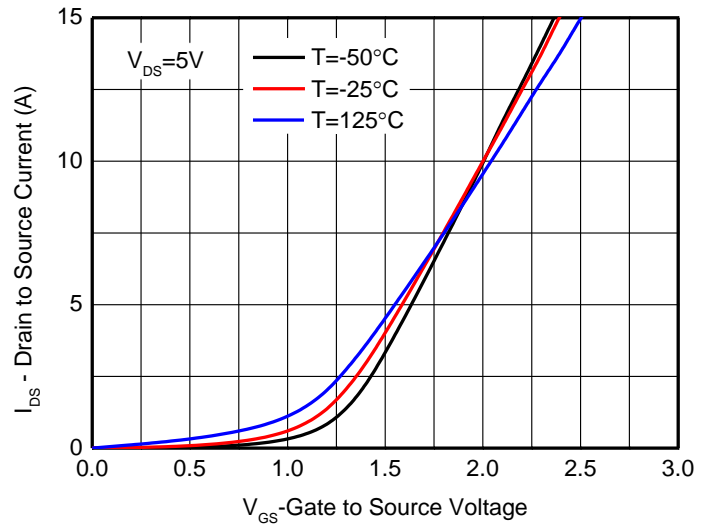
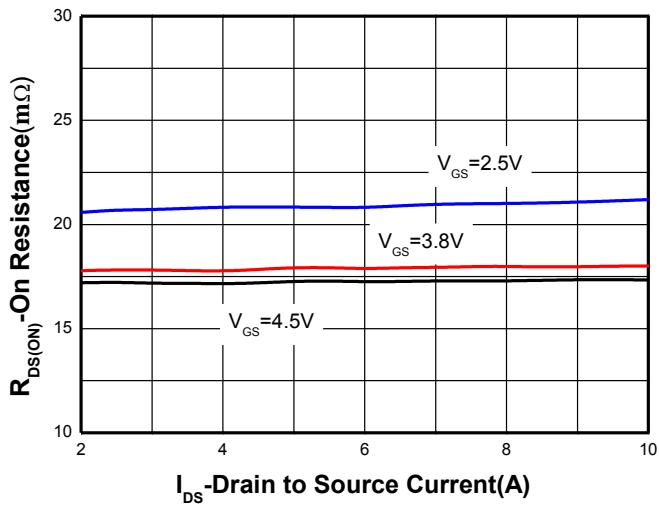
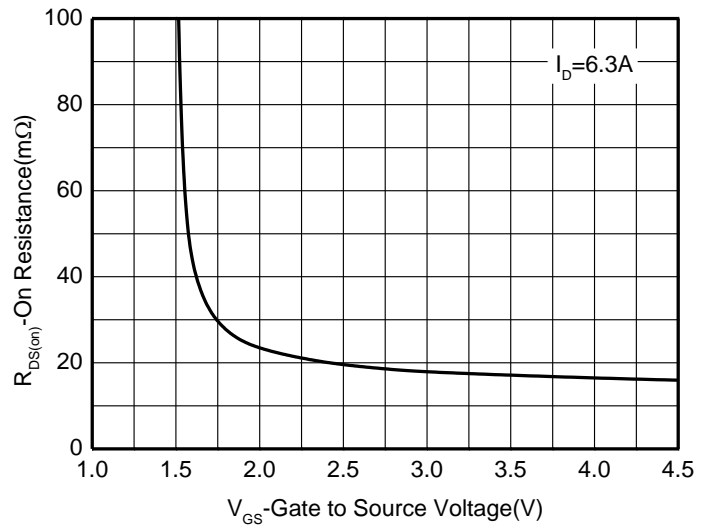
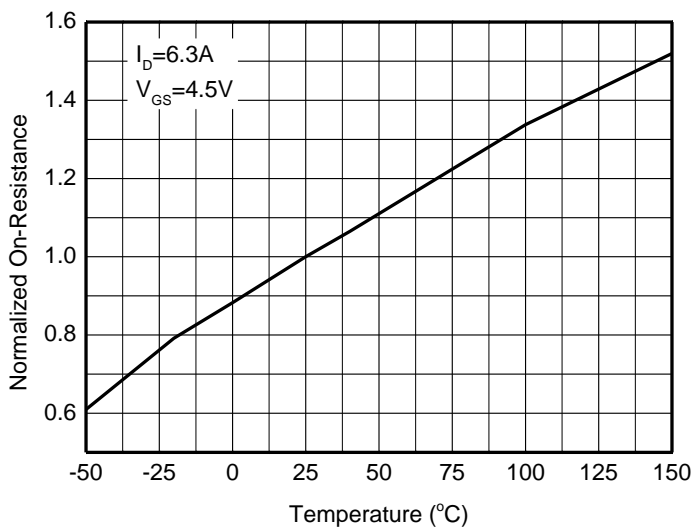
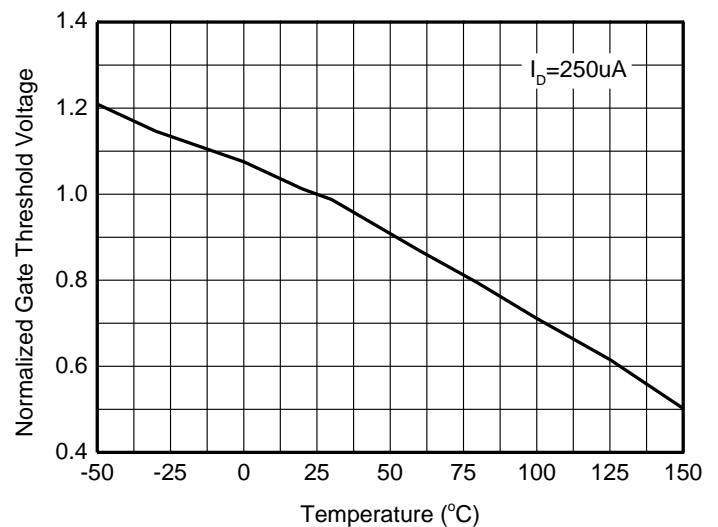
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

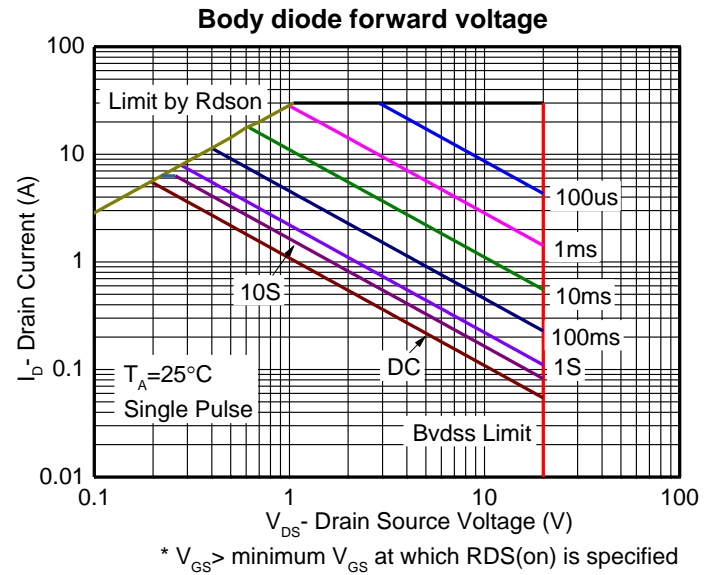
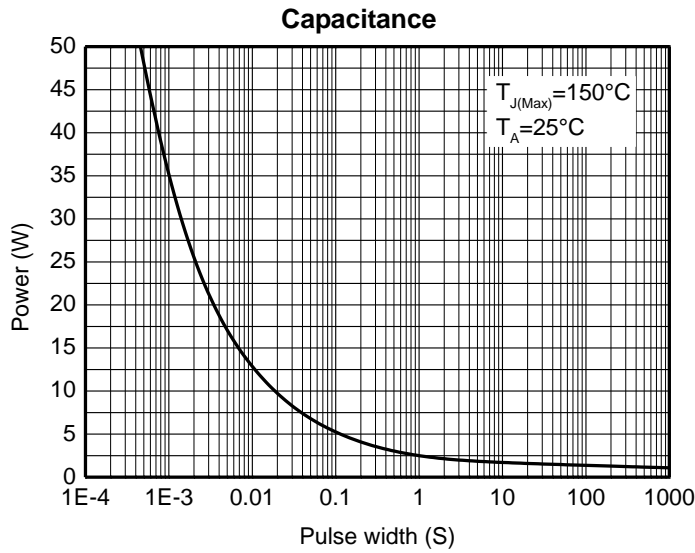
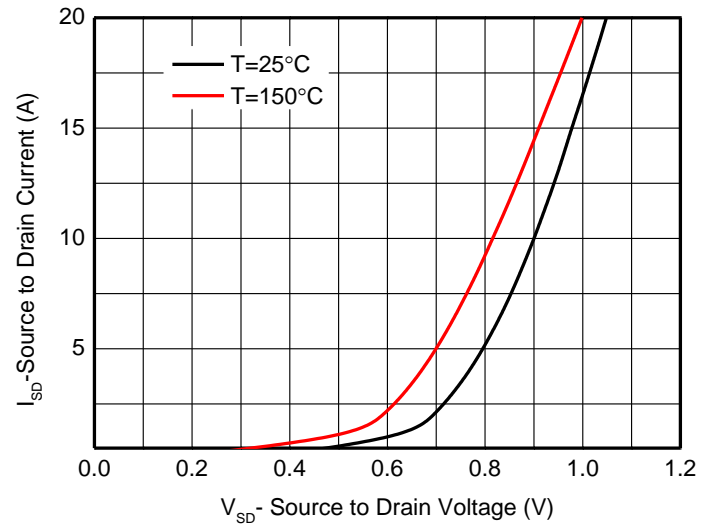
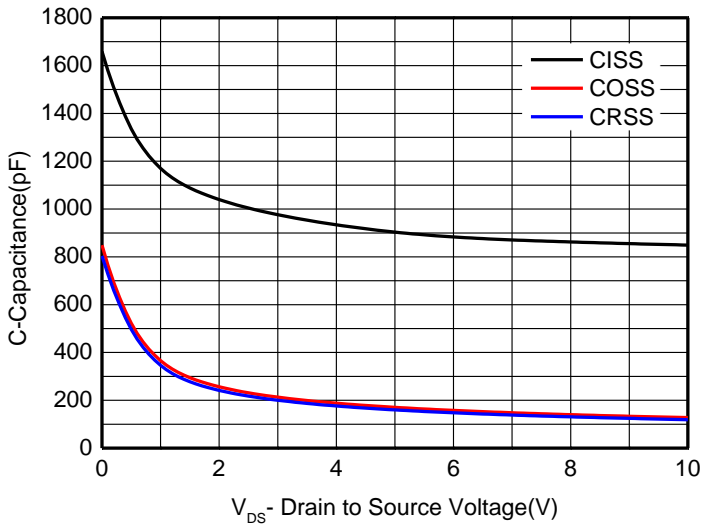
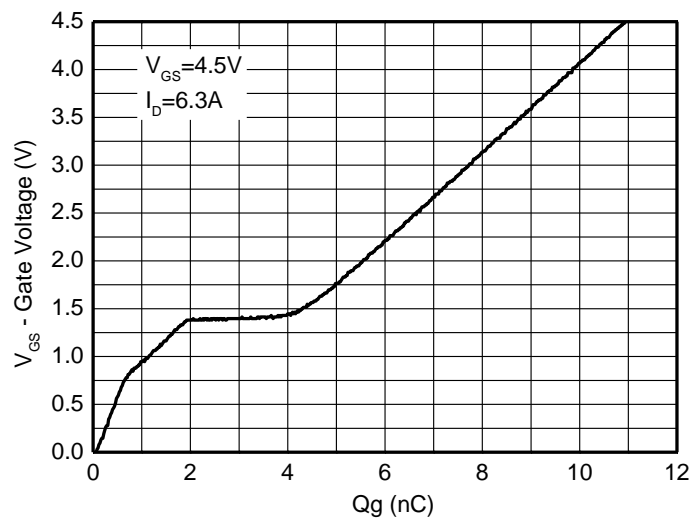
c Pulse width < 380 $\mu$ s, Duty Cycle < 2%

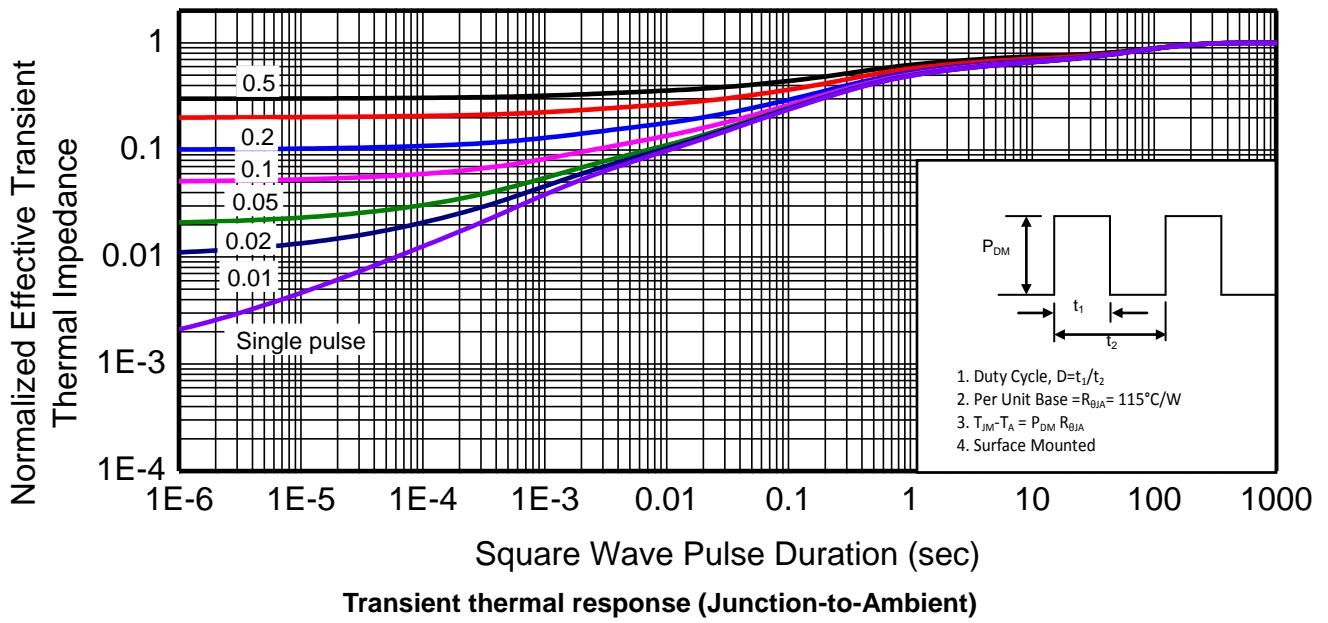
d Maximum junction temperature  $T_J=150^{\circ}C$ .

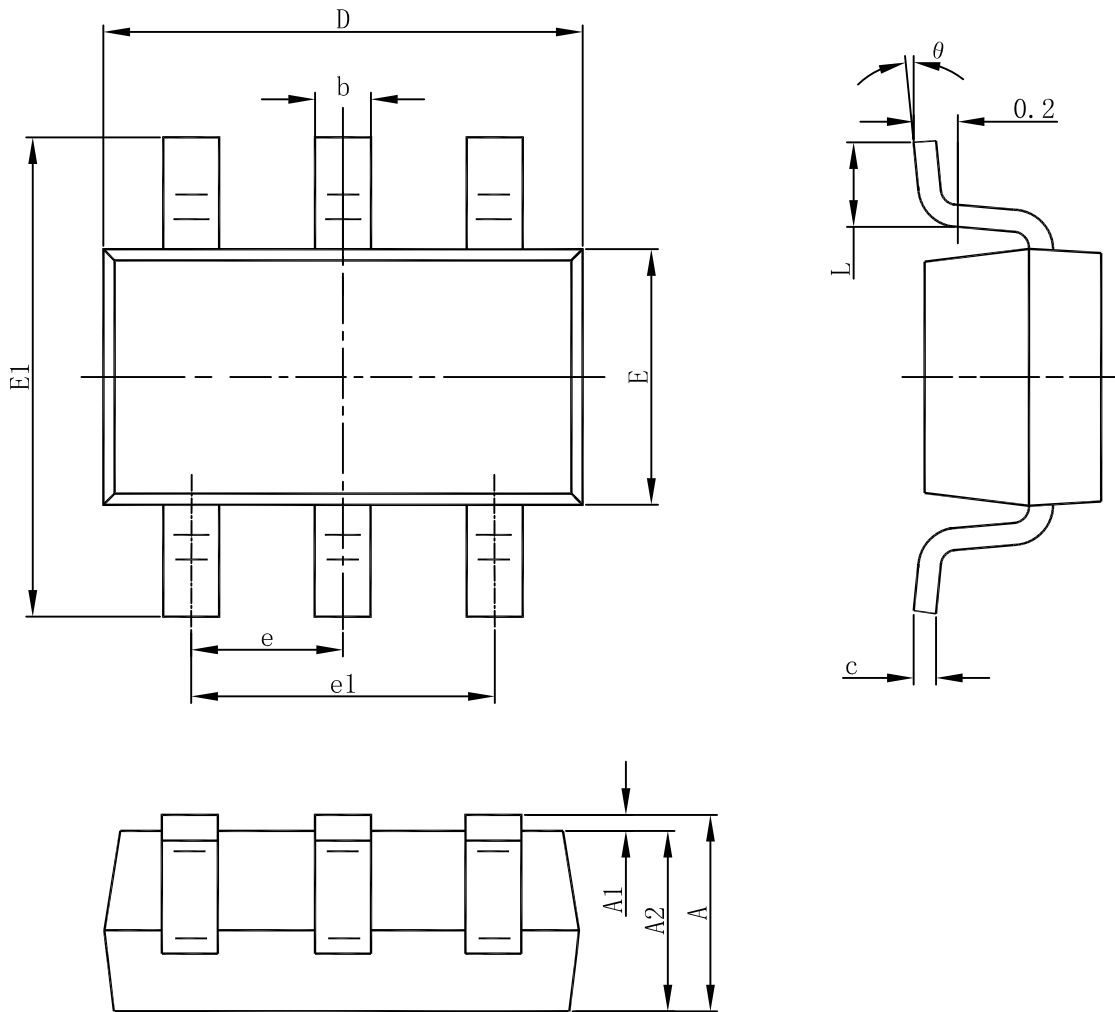
**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$	20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			$\pm 1$	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.5	0.7	1.0	V
Drain-to-source On-resistance <sup>b, c</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 6.3\text{ A}$	12	16	21	m $\Omega$
		$V_{GS} = 3.8\text{ V}, I_D = 6.0\text{ A}$	13	17.5	22	
		$V_{GS} = 3.1\text{ V}, I_D = 6.0\text{ A}$	14	18	23	
		$V_{GS} = 2.5\text{ V}, I_D = 5.5\text{ A}$	15	20	26	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5.0\text{ V}, I_D = 6.3\text{ A}$		16		S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1\text{ MHz},$ $V_{DS} = 10\text{ V}$		850		pF
Output Capacitance	$C_{OSS}$			127		
Reverse Transfer Capacitance	$C_{RSS}$			115		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 10\text{ V},$ $I_D = 6.3\text{ A}$		10.9		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.62		
Gate-to-Source Charge	$Q_{GS}$			1.92		
Gate-to-Drain Charge	$Q_{GD}$			2.0		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = 4.5\text{ V}, V_{DD} = 10\text{ V},$ $R_L = 2\Omega, R_G = 6\Omega$		22		ns
Rise Time	$t_r$			18		
Turn-Off Delay Time	$t_d(OFF)$			62		
Fall Time	$t_f$			28		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 1.0\text{ A}$		0.65	1.5	V

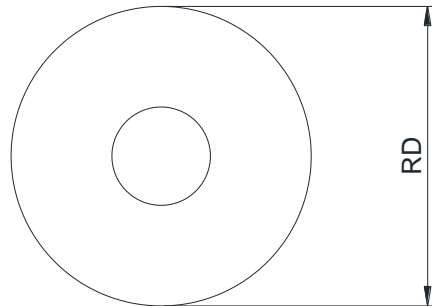
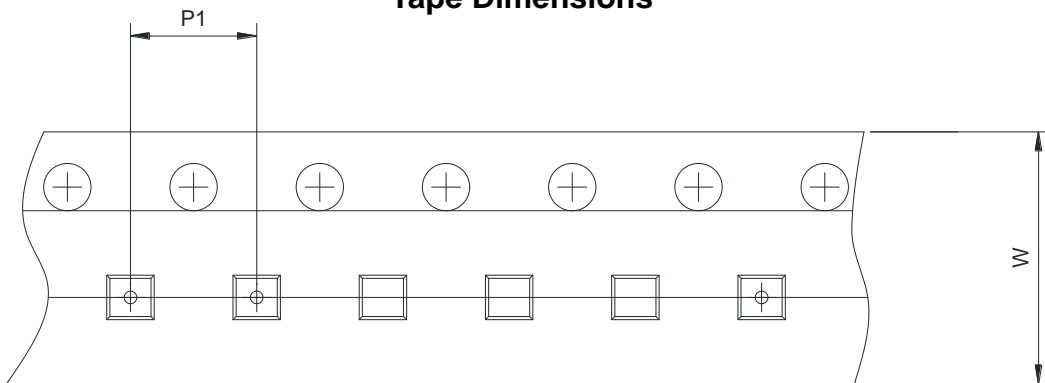
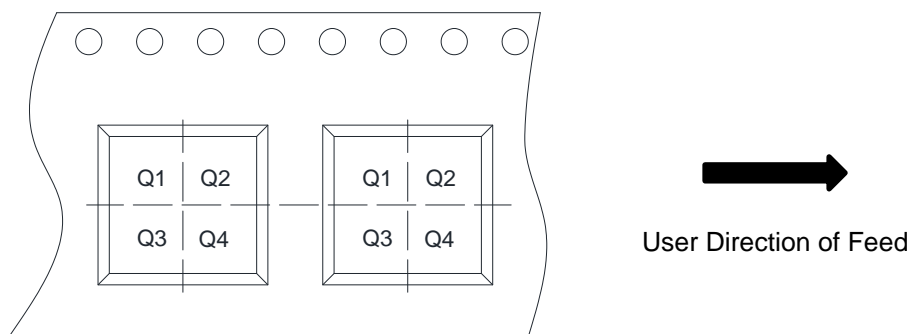
**Typical Characteristics (Ta=25°C, unless otherwise noted)**

**Output characteristics**

**Transfer characteristics**

**On-Resistance vs. Drain current**

**On-Resistance vs. Gate-to-Source voltage**

**On-Resistance vs. Junction temperature**

**Threshold voltage vs. Temperature**


**Single pulse power**
**Safe operating power**

**Gate Charge Characteristics**



**Package outline dimensions**
**SOT-23-6**


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	1.05	-	1.45
A1	0	-	0.15
A2	1.00	1.15	1.30
b	0.30	0.40	0.50
c	0.10	-	0.21
D	2.72	2.92	3.12
E1	2.60	2.80	3.00
E	1.40	1.60	1.80
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.30	-	0.60
L1	0.25 BSC		
theta	0 °	-	8 °

**TAPE AND REEL INFORMATION**
**Reel Dimensions**

**Tape Dimensions**

**Quadrant Assignments For PIN1 Orientation In Tape**


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm <input type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input type="checkbox"/> Q1	<input type="checkbox"/> Q2 <input checked="" type="checkbox"/> Q3 <input type="checkbox"/> Q4