

PRODUCT SUMMARY

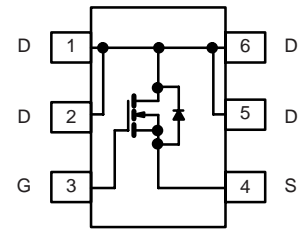
- $V_{DS(V)} = 30V$
- $I_D = 6 A$
- $R_{DS(ON)} < 38m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 50m\Omega$ ($V_{GS} = 4.5V$)

FEATURES

- Low On-Resistance

APPLICATIONS

- DC/DC Converters, High Speed Switching



SOT23-6

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150\text{ }^\circ\text{C}$)	I_D	$T_C = 25\text{ }^\circ\text{C}$	6 ^e
		$T_C = 70\text{ }^\circ\text{C}$	6 ^e
		$T_A = 25\text{ }^\circ\text{C}$	5.5 ^{b, c}
		$T_A = 70\text{ }^\circ\text{C}$	4.4 ^{b, c}
Pulsed Drain Current ($t = 300\text{ }\mu\text{s}$)	I_{DM}	25	
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	2.1
		$T_A = 25\text{ }^\circ\text{C}$	1.1 ^{b, c}
Maximum Power Dissipation	P_D	$T_C = 25\text{ }^\circ\text{C}$	2.5
		$T_C = 70\text{ }^\circ\text{C}$	1.6
		$T_A = 25\text{ }^\circ\text{C}$	1.3 ^{b, c}
		$T_A = 70\text{ }^\circ\text{C}$	0.8 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	75	100	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	R_{thJF}	40	50	

Notes:

- Based on $T_C = 25\text{ }^\circ\text{C}$.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5\text{ s}$.
- Maximum under steady state conditions is 166 $^\circ\text{C/W}$.
- Package limited.

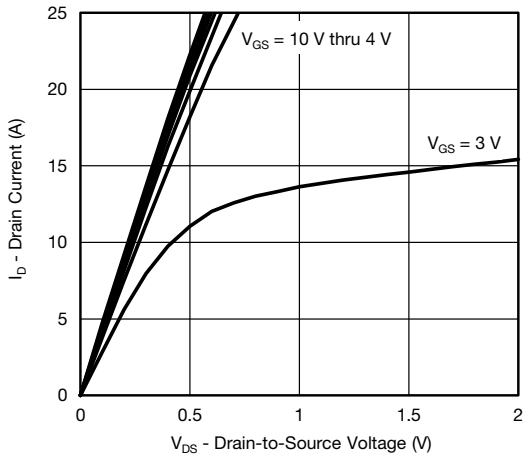
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		30		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-4.8			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.7		1.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 5.5\text{ A}$		26	30	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 5\text{ A}$		28	40	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 5.5\text{ A}$		24		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		424		μF
Output Capacitance	C_{oss}		100			
Reverse Transfer Capacitance	C_{rss}		42			
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 5.5\text{ A}$		8.2	13	nC
				4.2	7	
Gate-Source Charge	Q_{gs}	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.5\text{ A}$		1.4		
Gate-Drain Charge	Q_{gd}			1.4		
Gate Resistance	R_g		$f = 1\text{ MHz}$	2.5	12.6	25.2
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 3.4\text{ }\Omega$ $I_D \approx 4.4\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		6	12	ns
Rise Time	t_r			20	30	
Turn-Off Delay Time	$t_{d(off)}$			14	21	
Fall Time	t_f			10	20	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 3.4\text{ }\Omega$ $I_D \approx 4.4\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		3	6	
Rise Time	t_r			11	20	
Turn-Off Delay Time	$t_{d(off)}$			20	30	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			2.1	A
Pulse Diode Forward Current	I_{SM}				25	
Body Diode Voltage	V_{SD}	$I_S = 4.4\text{ A}, V_{GS} = 0\text{ V}$		0.82	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 4.4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		13	20	ns
Body Diode Reverse Recovery Charge	Q_{rr}			6	12	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			5		

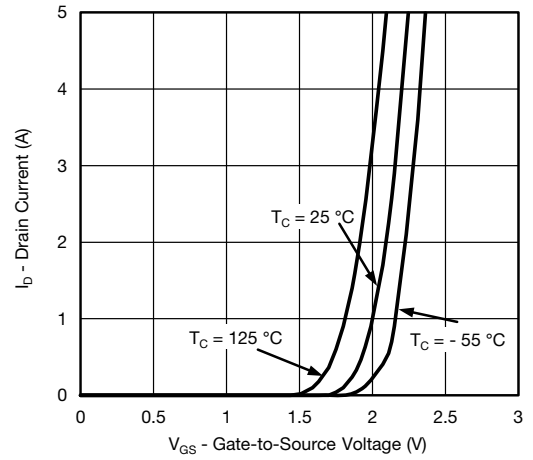
Notes:

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

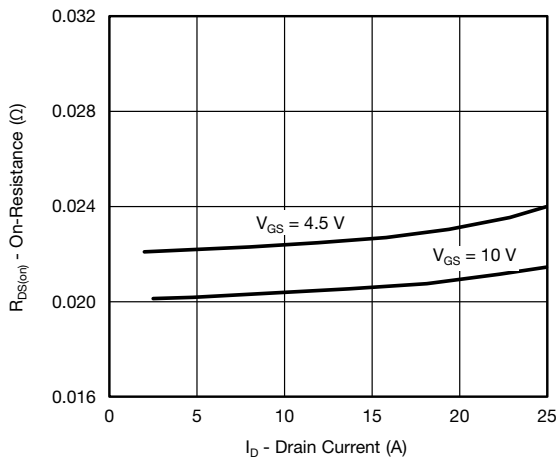
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



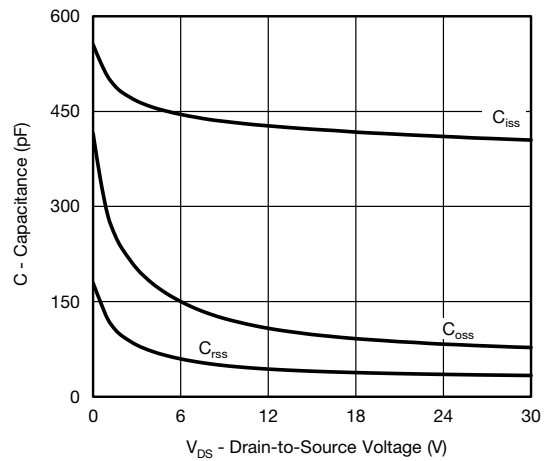
Output Characteristics



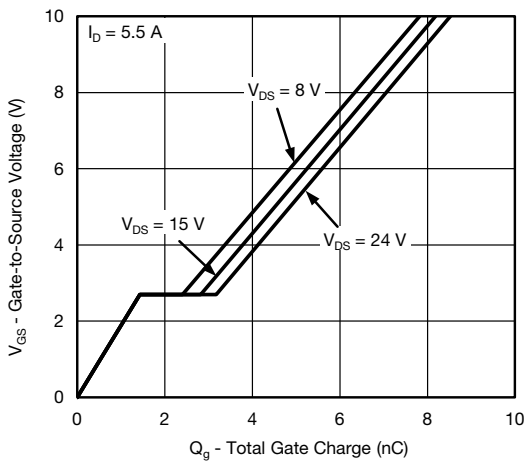
Transfer Characteristics



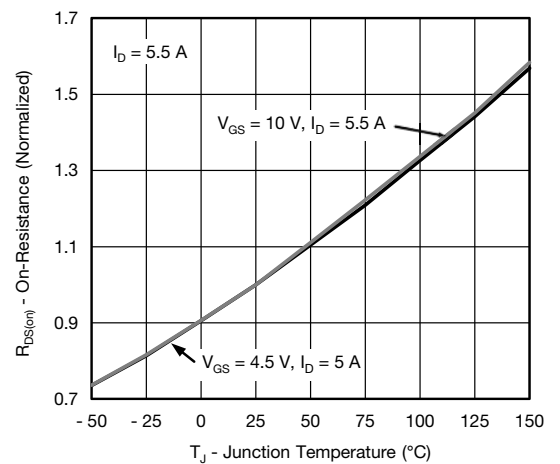
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

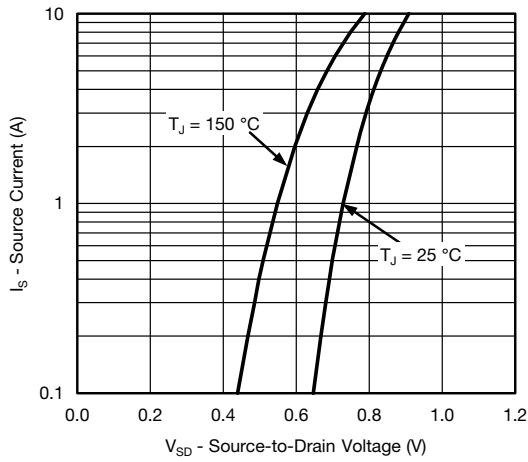


Gate Charge

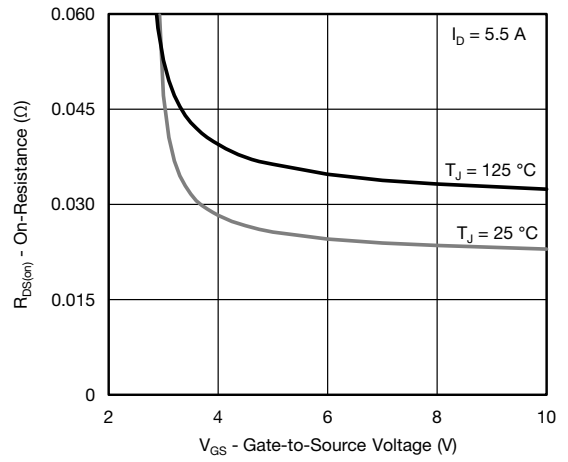


On-Resistance vs. Junction Temperature

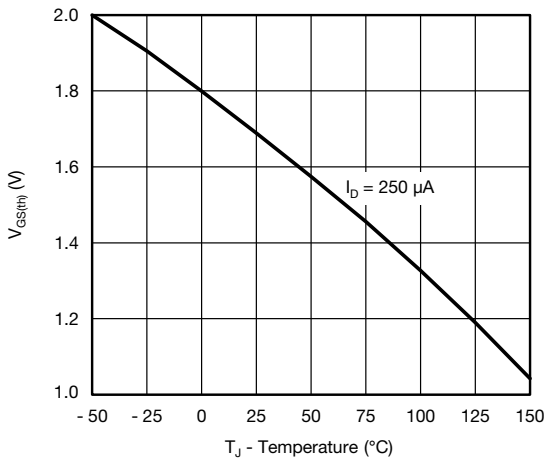
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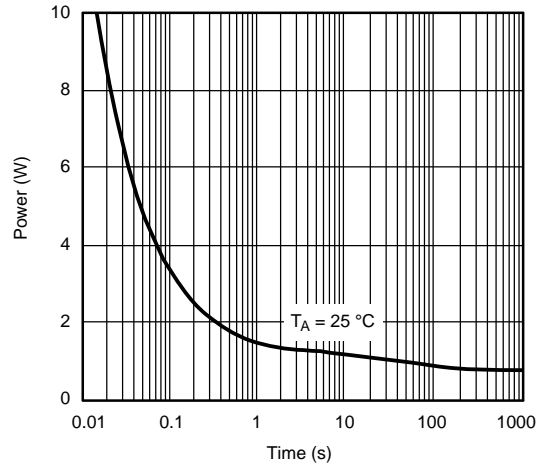
Source-Drain Diode Forward Voltage



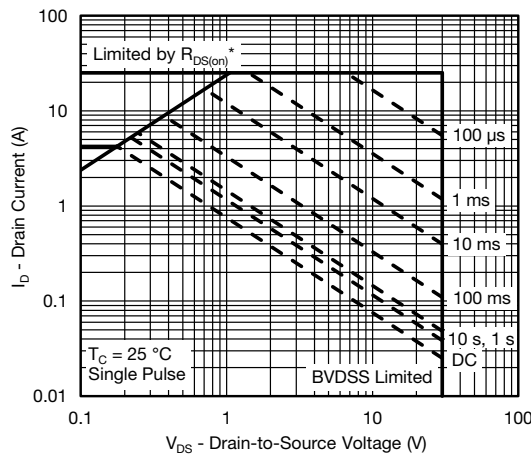
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

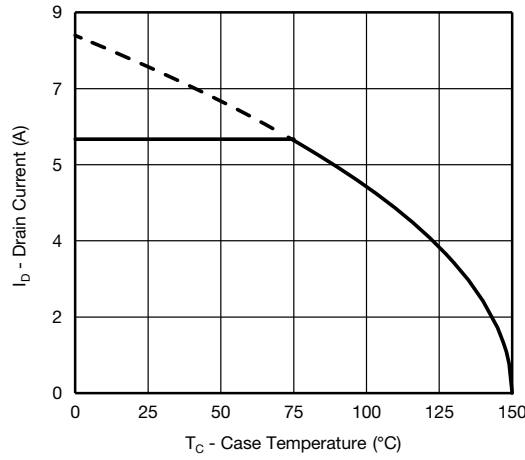


Single Pulse Power (Junction-to-Ambient)

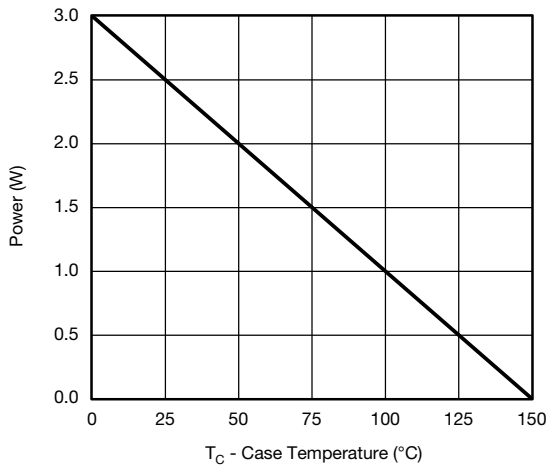


Safe Operating Area, Junction-to-Ambient

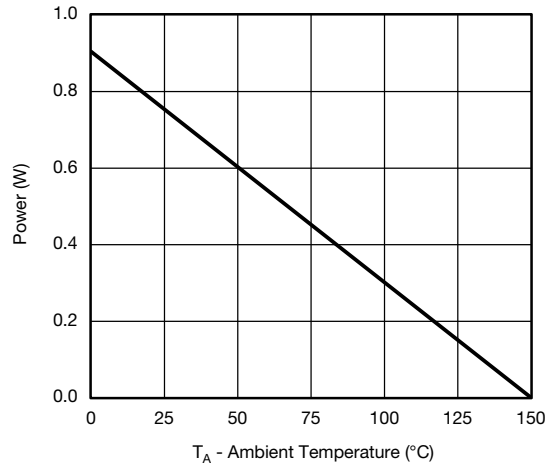
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



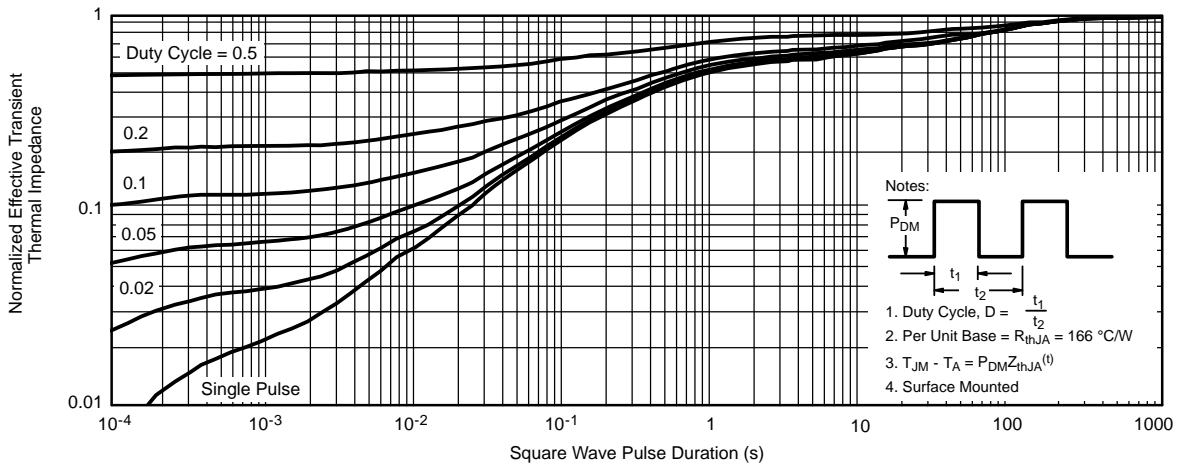
Power Derating, Junction-to-Foot



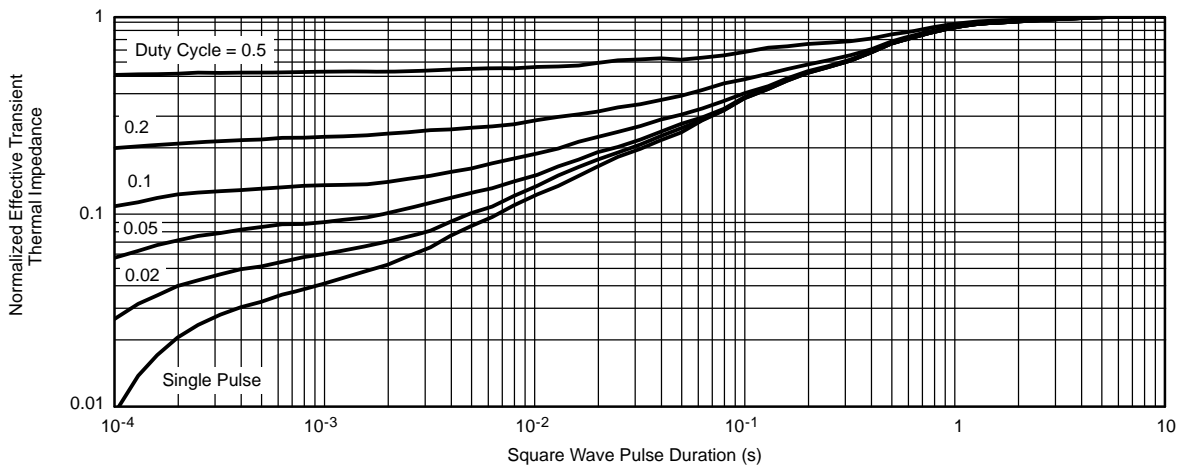
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max.)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

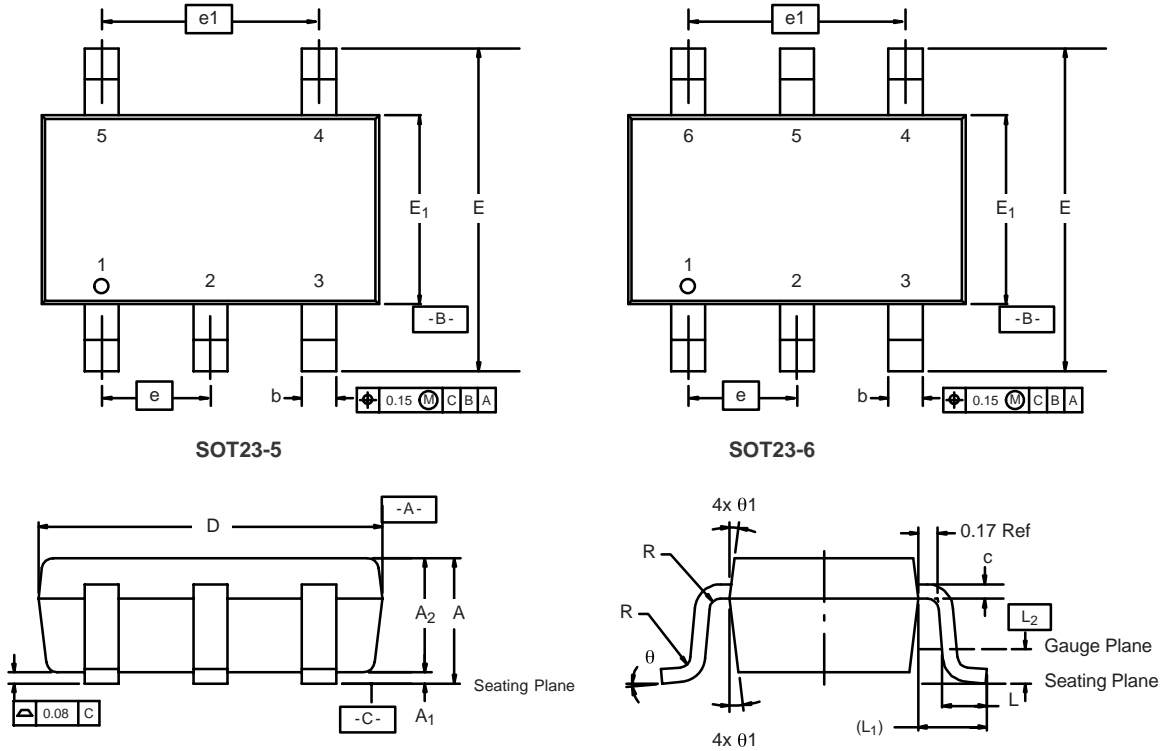


Normalized Thermal Transient Impedance, Junction-to-Ambient



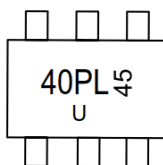
Normalized Thermal Transient Impedance, Junction-to-Foot

SOT23-5/6 PACKAGE OUTLIE DIMENSIONS



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A ₁	0.01	-	0.10	0.0004	-	0.004
A ₂	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E ₁	1.55	1.65	1.70	0.061	0.065	0.067
e	0.95 BSC			0.0374 BSC		
e ₁	1.80	1.90	2.00	0.071	0.075	0.079
L	0.32	-	0.50	0.012	-	0.020
L ₁	0.60 Ref			0.024 Ref		
L ₂	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ ₁	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06						
DWG: 5540						

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
AO6400	SOT23-6	3000	Tape and reel